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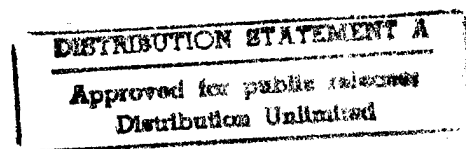
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# USSR Report

CONSTRUCTION AND EQUIPMENT

No. 67



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28 June 1982

# USSR REPORT CONSTRUCTION AND EQUIPMENT

No. 67

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## CONSTRUCTION

### EFFICIENT CAPITAL INVESTMENT IN RURAL AREA CONSTRUCTION

Moscow EKONOMIKA SEL'SKOGO KHOZYAYSTVA in Russian No 3, Mar 82 pp 66-73

/Article by I. Bystryukov, USSR deputy minister of agriculture: "Improvement in Construction in Rural Areas"/

/Text/ The 26th CPSU Congress determined the basic directions in the economic and social development of our country during the 11th Five-Year Plan and set new tasks for the implementation of the agrarian policy of the party.

The material and technical base of agriculture was strengthened considerably and the production of agricultural products was increased. At the same time, there are certain difficulties in the population's provision with agricultural products. In this connection the task of improving the food supply for the population was put in the forefront in the party policy. The accountability report by Comrade L. I. Brezhnev to the 26th party congress substantiated the need for the development of a special food program as an integral part of the five-year plan.

The accomplishment of the tasks set is based on the considerably increased material and technical base of agriculture. "We will continue," Comrade L. I. Brezhnev noted, "to allocate large financial and material resources for rural areas and to systematically transfer this sector to an industrial basis. However, the center of gravity--and this is the distinctive feature of the agrarian policy in the 1980's--now shifts to the capital investment yield, growth of productivity of agriculture and intensification and improvement in its relations with all the sectors of the agro-industrial complex."

Almost 190 billion rubles of capital investments are allocated for the development of agriculture in the entire set of operations during the 11th Five-Year Plan, as compared to 172 billion rubles in 1976-1980.

The task now is to utilize the allocated funds skillfully and with the greatest effectiveness. During the current five-year plan the growth of agricultural production is to be ensured mainly as a result of the sector's further intensification and an increase in the efficiency of utilization of land, the created production potential and the allocated material resources.

Certain positive results have been attained in construction in rural areas in the last few years. The measures taken to concentrate capital investments at key and start-up construction projects made it possible to come close to the fulfillment of the plan for the commissioning of fixed capital during the 10th Five-Year Plan, that is, on the whole, fulfillment made up 97 percent and on sovkhozes, 99 percent.

During that period well-managed dwelling houses of a total area of more than 65 million square meters were built, which made it possible to give a house warming to 1.3 million families of kolkhoz members and sovkhos workers. As a result of new construction the network of children's preschool institutions increased by 722,000 places. General educational schools for 1.62 million students and a large number of other projects for cultural-general and municipal purposes were put into operation. Significant work on the good order and gasification of kolkhoz and sovkhos settlements was carried out.

The assignments for the commissioning of barns for all types of livestock and poultry, poultry factories of egg and meat specialization, vegetable and potato storage facilities, silage and haylage structures, grain seed storage facilities, feed shops for animal husbandry and pasture watering projects were overfulfilled in 1976-1980.

During the 11th Five-Year Plan the rates of growth of capital investments for production purposes will be lower than during the 10th Five-Year Plan. However, there is a fundamental feature here--an accelerated development of feed production and feed preparation (a more than 1.5-fold growth), as well as the construction of plant growing projects (a growth of 16 percent). Preference is also given to the structures necessary to ensure the preservation of products. The programs of the current five-year plan envisage a significant increase in the construction of capacities for silage and haylage storage--up to 197 million tons, as compared to 117 million tons during the 10th Five-Year Plan. The provision of these structures in the country will reach 83 percent by the end of 1985 as compared to 55 percent in 1980. For example, in the Russian Federation the provision of capacities is to be increased from 53 to 92 percent and in the Turkmen SSR, from 30 to 83 percent. The provision of storage facilities for hay, pelletized feed, grass meal, potatoes, vegetables and fruits increases considerably.

About 2.9 billion rubles, or 42 percent more than during the 10th Five-Year Plan, are to be allocated for the construction of projects for the preparation and storage of grain.

A total of 1.7 billion rubles, or 2.2 times as much as during the past five-year plan, are to be allocated for the construction of warehouses for the storage of mineral fertilizers during the current five-year plan. This will make it possible to put into operation warehouse capacities for 13.7 million tons of one-time storage, as compared to 11.3 million tons during the past five-year plan. In 1985 the Uzbek, Kazakh, Georgian and Latvian SSR will be almost fully provided with these warehouses. The situation with the preservation of fertilizers in the RSFSR and the Ukrainian and a number of other republics will be improved considerably.

An important role is assigned to the construction of motor roads in rural areas. This problem is considered one of the key factors in an increase in the efficiency of agriculture. During this five-year plan 4.7 billion rubles of capital investments, or 42 percent more than during the 10th Five-Year Plan, are to be allocated for the construction of motor roads on sovkhoses and kolkhoses.

An increase in capital investments for measures for raising the active part of fixed productive capital is envisaged during the current five-year plan. As compared with the 10th Five-Year Plan the allocations for the purchase of machinery

and equipment will be increased by almost 9 billion rubles, or by 17 percent. Their proportion in the volume of capital investments for production purposes will rise from 35.4 percent during the 10th Five-Year Plan to 40 percent during the 11th Five-Year Plan.

As already stated, the maximum possible increase in the effectiveness of capital investments is one of the most important economic tasks of the 11th Five-Year Plan. An increase in capacities at existing enterprises as a result of the introduction of advanced technology, reconstruction and technical retooling produces the greatest effect in this matter. Capital investments amounting to 23.8 billion rubles are allocated for these purposes, which is 6 billion rubles more than utilized in 1976-1980.

An efficient utilization of all the capabilities of agricultural production is directly connected with the solution of social problems in rural areas. The 26th party congress mapped out a number of measures in this field. As a result, capital investments for nonproduction construction during the 11th Five-Year Plan were envisaged in the amount of 37.9 billion rubles, as compared to 26 billion rubles during the 10th Five-Year Plan.

The construction of individual well-managed houses with private plots and farm buildings for livestock and poultry in rural areas has become widespread in the last few years. In this connection we must especially stress the great importance of the decree dated 19 June 1978 of the CPSU Central Committee and the USSR Council of Ministers "On the Further Development of Construction of Individual Dwelling Houses and Personnel Retention in Rural Areas." It is important to note that in accordance with this decree the norms of planning of individual dwelling houses and farm structures were revised for the purpose of creation of the conditions necessary for the management of the private subsidiary sector, as well as new standard plans for dwelling houses, which in their good order and planning solutions met the needs of the rural population, were developed.

The decree dated 5 October 1981 of the USSR Council of Ministers "On Individual Housing Construction" was the next step in this matter. In particular, this decree instructed the USSR State Planning Committee to stipulate in the drafts of state plans for the economic and social development of the USSR the limits of capital investments and of construction-installation and contract work and the material and technical resources necessary to ensure the construction of individual dwelling houses and also envisaged the implementation of a number of other measures aimed at the expansion of the scale and improvement in the quality of construction of such houses.

As a result of the implemented measures, the proportion of one-story single-apartment houses of the farmstead type with the necessary farm structures, which most fully meet the needs of the rural population, has increased in rural housing construction in the last few years. In 1980 the proportion of farmstead houses in the total volume of state rural construction comprised 55 percent.

The volume of construction of dwelling houses equipped with water supply, central heating, sewage and gas supply systems also rose. For example, whereas the proportion of fully appointed houses commissioned at the expense of the state in rural areas comprised 27 percent in 1975, it reached 33 percent in 1980. During the 11th Five-Year Plan this process will be developed further and by 1985 the proportion of one-story farmstead houses in the total volume of state rural construction will reach 65 percent.

Capital construction is one of the most important means of ensuring the development of all material production sectors and the further improvement in the people's housing and cultural-general living conditions. Therefore, it is very important to plan it correctly.

The correct planning of capital investments should ensure an increase and improvement in the production capacities and fixed capital necessary for the provision of the proportions and rates of development of agriculture, expansion of available housing and construction of projects for municipal and domestic services and of a network of educational, cultural, scientific and public health institutions, proportions and rates envisaged in the state plan for economic and social development.

The determination of the optimum correlation between the commissioning of fixed capital and the volume of capital investments for the planned period is one of the basic problems in the planning of capital investments. It is well known that a more rapid commissioning of projects under construction accelerates the turnover of funds invested in kolkhoz and sovkhoz construction and lowers its cost. At the same time, the volume of incomplete construction is lowered. The dissipation of capital investments over a large number of carry-over and newly begun projects is the main shortcoming in the planning of construction. In connection with this start-up projects are not fully provided with monetary and material resources and construction periods and, consequently, the periods of recovery of capital investments are prolonged.

The CPSU Central Committee and the USSR Council of Ministers adopted a number of important measures to ensure a higher concentration of capital investments and their balance with the volumes of material resources, capacities of construction organizations and manpower. At the same time, provision was made to greatly intensify the concentration of capital investments on top-priority and start-up construction projects and to reduce the size of new construction.

The realization of these fundamentally important directions in the policy of capital investments creates favorable conditions for the attainment as early as 1982 of a breakthrough in capital construction, a significant acceleration of the commissioning of fixed capital and a reduction in the size of incomplete construction and above-standard stocks of uninstalled equipment. The task set is quite realistic. There are definite results in this matter right now. For example, in the system of the USSR Ministry of Agriculture the volume of capital investments for the construction of agricultural projects was about 12.9 billion rubles in 1981. The actual commissioning of fixed capital continues to increase annually. With the negligible growth of capital investments in the last 3 years a reduction in the volume of incomplete construction was attained. It was lowered from 56 percent of the fulfilled volume of capital investments in 1979 to 53 percent in 1981.

In the programs of the 11th Five-Year Plan there is a fundamentally new approach to the distribution of capital investments and construction organization. Principal attention is given to an increase in the effectiveness of capital investments and to a better coordination of capital construction with the material and technical resources and capabilities of construction and installation organizations. On this basis provision is made for a considerable excess of the rates of growth of the commissioning of fixed capital as compared with an increase in capital investments, for a reduction in incomplete construction and for bringing it up to the standard level by the end of the five-year plan.



The technological structure of capital investments is being improved. The proportion of construction and installation work in the total volume of capital investments is being lowered from 54 percent in 1976-1980 to 51 percent in 1981-1985.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" establishes a procedure for the preparation of long-term plans for economic and social development.

The five-year plan with an annual distribution of assignments is the main form of state planning of capital construction. Indicators concretizing and in some cases refining the assignments established for a corresponding year of the five-year plan are affirmed in annual capital construction plans. At the same time, the limits of capital investments and construction-installation work established in the five-year plan are not subject to reaffirmation.

Provision is made for the stability and continuity of effect of five-year capital construction plans, increase in the responsibility of clients and contractors for a prompt commissioning of production capacities and projects and a balance of the plan with the possibilities of allocation of materials and technological and power equipment with labor and financial resources, as well as with the capacities of construction and installation organizations.

A normal implementation of construction is inconceivable without its prompt and full financing. The financing of capital investments represents the distribution of monetary assets for the purpose of increasing the sector's production capacities and fixed capital. The procedure of capital construction financing was established by the Rules of Construction Financing. On the basis of the indicated rules the capital investments of state enterprises, organizations and institutions are financed in accordance with the state plan for the economic and social development of the USSR, the state budget of the USSR and the credit plan.

Construction at the expense of credit granted by the bank to the contractor in the amount of the full cost of construction determined by an estimate is now practised on many farms. An estimate correctly prepared and accepted by a contracting construction organization is the basic document for settlements of accounts between clients and construction organizations. The accounts between the client and the contractor for built projects prepared for the output of finished products are settled after their acceptance by the client. The contractor liquidates the credits obtained after the final settlements of accounts with the client.

The introduction of the system of financing for a fully completed project without any intermediary or partial settlements of accounts into construction accelerates the completion of construction and installation work and the commissioning of projects and prompts construction organizations to concentrate the necessary labor, material-technical and financial resources on start-up and other key projects. A construction organization is interested in delivering projects to clients ahead of schedule in order to recover its own funds invested in construction.

A correct material and technical supply for economic and social development plans is one of the important factors in a successful implementation of capital construction. It is realized by means of the plans for the distribution of material and technical resources according to the basic directions in their utilization and to holders of capital.

Material balances and distribution plans are developed on the basis of an overall approach to the planning and utilization of material and technical resources and the use in calculations of a progressive standard base taking into consideration the effect of the achievements of scientific and technical progress, as well as a prompt uncovering of additional reserves.

The need of capital construction for materials is determined according to the average norms of expenditure per million rubles of the estimated cost of construction and installation work, which are calculated on the basis of objective and sectorial norms and the structure of construction and installation work according to intra-sectorial directions in construction.

The sectorial and intrasectorial structure of construction and installation work is developed on the basis of title lists of construction projects at the expense of state capital investments and separately at the expense of the internal funds of kolkhozes.

The average norms of expenditures of materials per million rubles of the estimated cost of construction and installation work for the planned year are determined according to the sectorial norms of expenditure of the current year's plan and the sectorial structure of construction and installation work for the planned year with due regard for a number of factors lowering and increasing the norm.

The norms take into consideration the waste and losses of materials during the performance of construction and installation work and the manufacture of building structures and articles.

The average norms of expenditure and the assignments for the saving of materials are differentiated and presented by ministries and departments to main administrations and associations engaged in construction.

The need of construction organizations and enterprises engaged in construction by the economic method for material resources is determined according to the physical volumes of work.

For the fulfillment of the increasing volumes of construction in rural areas the USSR Ministry of Rural Construction was formed in January 1967. This ministry was entrusted with the management of rural construction in the country, the development of the general problems of construction organization and the introduction of the achievements of science and technology, as well as of advanced experience, into rural construction. The ministry carried out contract work on the building up of sovkhozes and kolkhozes, as well as other agricultural enterprises. Ministries of rural construction were organized in all the Union republics (except for the Latvian SSR and the Estonian SSR). Territorial administrations, trusts, construction and installation administrations and mobile mechanized columns were established in their structure.

The organizations of this ministry developed into large construction subdivisions. Every year they perform construction and installation work worth more than 5.2 billion rubles.

The construction organizations of other ministries and departments also work in rural areas. It must be noted that contracting ministries and departments engaged in construction and installation work on agricultural projects do not fulfill the assignments established for them year after year.

The general level of fulfillment of the contract work plan of the USSR Ministry of Agriculture is declining. In 1976 it fulfilled the plan 93 percent, in 1977, 91 percent, in 1978, 90 percent, in 1979, 89 percent and in 1980, 88.5 percent. The proportion of the USSR Ministry of Rural Construction, the basic contracting organization in rural areas, in the total volume of construction and installation work comprised 30 percent in 1975, declining to 26 percent at the end of the 10th Five-Year Plan.

As a result of the underfulfillment of the contract work plan by construction ministries a considerable part of the production capacities and projects on sovkhozes and other state farms were not put into operation.

Interkolkhoz construction organizations are the basic contracting organizations for construction on kolkhozes. Interkolkhoz construction organizations have developed at rapid rates in the last few years. Kolkhozes invested one out of 10 rubles in the development of their production base. The fixed capital of interkolkhoz construction organizations totaled 9.5 billion rubles at the end of the 10th Five-Year Plan. A total of 1.2 million people, including 120,000 engineering and technical workers, now work in the system of interkolkhoz construction organizations. In 1981 these organizations performed construction and installation work worth almost 5.5 billion rubles. The development of the production base and the equipment of interkolkhoz construction organizations with machinery--all this contributed to an increase in labor productivity, which rose 21 percent by 1980 as compared to 1975. In 1980 alone interkolkhoz construction organizations commissioned fixed capital of their own construction worth 1 billion rubles.

In 1980 the industrial enterprises of interkolkhoz construction organizations manufactured building materials, articles and structures worth 2.1 billion rubles, including 7.7 million cubic meters of precast reinforced concrete, 56.7 million cubic meters of nonore materials, 1.4 million tons of cement, 306,000 tons of lime and more than 5.5 million square meters of carpentry articles and procured and extracted 6.3 million cubic meters of round timber.

On the average, in the country interkolkhoz construction organizations account for 57 percent of the total volume of construction on kolkhozes. It is much higher in individual Union republics. Furthermore, interkolkhoz construction organizations now perform work for sovkhozes and other state agricultural enterprises and organizations worth about 1 billion rubles.

Along with this interkolkhoz construction organizations as yet do not utilize considerable potentials. The existing production capacities are not fully utilized, that is, for the production of precast reinforced concrete and carpentry articles, 75 to 80 percent, wall materials, 70 to 80 percent, light fillers, 50 to 60 percent and so forth. Nor is the existing equipment fully loaded. For example, in 1980 single-bucket excavators operated only 5.4 hours per shift, scrapers, 1.3 hours, bulldozers, 2.4 hours and crane trucks, 5.9 hours.

Many interkolkhoz construction organizations do not fulfill contract work plans, including for kolkhozes, do not cope with the assignment for labor productivity growth and permit losses.

A large volume of construction and installation work is also carried out by the economic method. Its share in the total volume of construction and installation work comprises 32 percent on the kolkhozes of the USSR Ministry of Agriculture and 38 percent on its sovkhozes.

The prompt commissioning of capacities and fixed capital is now the basic evaluation of the fulfillment of the capital construction plan. The transition to the most progressive form of settlement of accounts between the client and the contractor for fully completed and commissioned enterprises, stages and start-up complexes and projects prepared for the output of products or the rendering of services according to the estimated cost of commodity building output greatly contributes to the above. Furthermore, when the time of commissioning of capacities is shortened by contracting organizations, as compared to the approved norms, the general contractor receives from the client capital at the rate of 50 percent of the profit envisaged by the plan for the period by which the time of construction is shortened. This capital is assigned for the economic incentive fund of the organizations participating in construction.

The successful implementation of construction plans depends to a large extent on the prompt provision of construction projects with high-quality planning estimates. On 30 March 1981 the CPSU Central Committee and the USSR Council of Ministers adopted the decree "On Measures for the Further Improvement in Planning Estimate Work," which raises the solution of these problems to a high-quality, new stage. It is suggested that party, Soviet and economic bodies take measures to improve the work of planning and surveying organizations and to develop the creative initiative and to raise the level of occupational knowledge of their workers with a view to ensuring the creation of plans of enterprises, buildings and structures meeting the modern requirements of scientific-technical and social progress and the conditions of transfer of the economy to the intensive path of development in accordance with the decisions of the 26th CPSU Congress.

Great responsibility in the implementation of these measures rests with the clients of plans and planning organizations, which are called upon to prepare by joint efforts high-quality planning estimates for the construction of projects in a short time.

In the realization of these requirements of great importance is the transition to settlements of accounts between the client and the planning organization for a completed planned product, which represents the further development of cost accounting relations between them. In this case the payment for planning work is made only once for fully completed and accepted documents according to the full estimated cost of their preparation. The errors and omissions detected subsequently are eliminated by planning organizations without an additional payment. Such a measure disciplines the planning organization and forces it to prepare documents on the dates scheduled and in the necessary set, otherwise the client will not pay for this work.

However, there are also serious shortcomings in this important matter. The rise in the estimated cost of agricultural production construction, which has occurred in the last few years, evokes concern. For example, in the last 10 years the expenditures on the construction of dairy farms per place for one animal more than tripled. There was a similar situation during the construction of other projects. The unsubstantiated replacement of building structures and materials stipulated by plans with more expensive ones at the requests of contracting construction organizations is often the reason for the rise in the cost of construction of agricultural projects.

Contracting construction organizations poorly staff rural construction projects with working personnel and do not provide them with the necessary amount of construction equipment, transport facilities, materials and structures.

Planning documents often are prepared on a low technical level and for various reasons plans are often altered, which leads to unproductive expenditures and to a prolongation of the time and rise in the cost of construction.

Many existing plans of rural houses do not satisfy dwellers in their design, quality and degree of good order. Settlements are often built incomplete and at a low architectural construction level. Problems of engineering equipment of settlements, that is, water and heat supply and a sewage system, especially for farmstead construction, are solved slowly.

At present, in practice, a service for the maintenance of buildings and engineering networks and structures is absent in rural areas. Often there is no one to change electric wiring, to supply gas and water or to fix a roof.

Modern construction should correspond to the ever higher demands and tastes of rural residents, as well as to overall economic development. Rural dwelling houses should be architecturally expressive and have a high level of comfort.

The necessary measures are taken to eliminate the shortcomings existing in rural construction. For example, in the last few years steps have been taken to improve the quality of planning of agricultural production projects. At the same time, special attention was paid to the correct selection of sites for the construction of projects with due regard for minimal expenditures on the development of the territory and the construction and maintenance of the engineering networks and structures outside the sites. Work is done on the study and generalization of the experience in the planning and construction of agricultural projects, on the attainment of the planned capacities and technical and economic indicators and on an economic analysis of planning solutions for the purpose of finding the potentials for a reduction in the estimated cost of construction and in the expenditures of fuel and power resources, metal, cement and other materials.

An expansion of the scale of application of local building materials--brick, sand, rubble, gravel, lime and cast-in situ concrete--for construction in rural areas is an important measure in this respect. However, it should be noted that all these materials are quite widely used only with the economic method of construction. Contracting construction organizations try under any pretext to get away from them

and to use heavy precast reinforced concrete structures, for example, pavement slabs, for construction, which greatly increases the cost of construction. It should also be stated that ministries and departments engaged in construction in rural areas should have organized the production of lightened reinforced concrete and other economical structures so as to completely eliminate the use of parts of industrial buildings in rural construction projects in 1981. However, by no means all the contracting construction organizations of ministries and departments are imbued with the importance of this measure and continue to use in rural areas heavy and expensive structures designed for industrial installations.

However, let us turn to the measures taken. The norms of technological planning of barns for large-horned cattle, hogs, poultry and sheep, of projects for the storage and processing of potatoes, vegetables and fruits, of mineral fertilizer warehouses and of hothouse combines have been revised, which makes it possible to lower the cost of their construction by 5 percent. Furthermore, the design parameters for the building structures of buildings and installations have been changed, lowering their cost and material intensiveness.

The standard plans of agricultural production complexes, buildings and structures have been revised and about 200 obsolete and inefficient plans have been eliminated from those in effect. A number of standard plans ensuring a reduction in the cost of construction as a result of the application of more advanced technological and engineering solutions have been developed. For example, in the new plans of poultry factories for 3 million broilers, complexes for the annual breeding and fattening of 27,000 hogs and others the specific indicators of the estimated cost of construction have been lowered by 3 to 4 percent. The fulfillment of an overall plan for the development in 1981-1985 of new technological equipment and, on its basis, of standard plans has been organized. New design solutions with a nonwelded connection of the units of fully prefabricated production buildings are being developed. An experimental construction of these buildings has confirmed the possibility of reducing the labor expenditures on and of improving the quality of construction.

Measures to intensify financial control over an effective and purposeful utilization of capital investments in rural construction have been determined. Provision has been made for the introduction of maximum indicators of the cost of construction per unit of capacity. The use of standard planning documents and building structures, which eliminates the development of inefficient planning solutions, has been regulated. Unified specifications for the construction planning of agricultural enterprises, buildings and installations have been developed with due regard for the zonal characteristics of rural construction, limitation of the list of structures and size schemes of buildings and expansion of the use of light efficient structures. A scientific-technical overall program for the development and introduction of efficient types of agricultural enterprises, buildings and installations with a high level of industrialization of their construction has been prepared.

An overall engineering preparation of building production is being introduced, the brigade contract, flow methods of construction, technological production outfitting of projects under construction and operative control management are being expanded and the operation of rural construction and house-building combines as a

new advanced form of rural construction is being improved. Whereas 46 combines operated in 1980, there will be 131 such combines by the end of the current five-year plan. In 1985 they will put into operation 8 million square meters of production projects and 5.2 million square meters of residential and cultural-general buildings of a total value of 1.4 billion rubles.

The base of rural construction is being reconstructed in the direction of the further development of the production of lightened industrial structures, efficient building materials, fully prefabricated blocked cleaning installations, transformer substations, boiler rooms and other projects for the engineering equipment of rural settlements. During the current 5-year period the use of light concrete structures is to be increased 1.5-fold, of glued wooden structures, 1.4-fold and of large-panel house building structures, 2.2-fold.

This will make it possible to raise the level of fully prefabricated construction to 75 percent in 1985. A procedure for the elaboration of overall schemes for the development and distribution of the material and technical base of the ministries of rural construction of the Union republics and republic interkolkhoz construction associations providing for interdepartmental specialization and mutual deliveries of building structures and materials has been established.

The quality of construction is also improving. Whereas in 1976 the projects put into operation with good and excellent ratings comprised 61 percent of their total number, in 1980 they comprised 82 percent. The expenditures on the alteration of poorly performed projects were lowered by 30 percent. As a result of the measures taken the number of projects put into operation on and ahead of schedule increased. Thus, serious steps have been taken in the direction of improvement in capital construction in rural areas. Rural builders are fully resolved to make maximum efforts so that their sector may make a more significant contribution to the strengthening and expansion of the material and technical base of agriculture.

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## CONSTRUCTION

UDC 69.003:658.012.2

### PROBLEMS IN CAPITAL CONSTRUCTION, INDEXES DISCUSSED

Moscow EKONOMIKA STROITEL'STVO in Russian No 4, Apr 82 pp 3-11

[Article by V. A. Balakin, Deputy Chief of the Construction and Construction-Industry Division of USSR Gosplan: "Speed Up the Execution of Measures for Improving the Economic Mechanism in Construction"]

[Text] Capital construction was defined at the November 1981 CPSU Central Committee Plenum as one of the decisive sections of the 11th Five-Year Plan. The Plenum's decree noted that special attention should be paid to the substantial improvement of capital construction.

Thanks to the party's and government's tireless concern, a high-capacity construction industry has been established in our country. There are at present 27,000 state primary contracting construction and installing organizations, which employ 11.5 million people. The cost of construction's fixed production capital, the chief content of which is its active portion--construction machinery and transport means--has reached 55 billion rubles. The fleet of excavators that were in operation in construction numbered 164,000 units at the start of the current five-year plan and 161,500 bulldozers and 208,000 mobile cranes (aside from special ones) were then in operation. The branch creates about 10 percent of the entire gross social product.

However, the state of affairs in capital construction and the work of construction and installing organizations in recent years have not been meeting fully the requirements of the country's economic and social development in the modern era.

Tenth Five-Year Plan tasks for introducing some production capacity and facilities that were important for the national economy were not fulfilled. Capital investment continued to be dispersed over numerous construction projects and facilities, as a result of which the amount of uncompleted construction rose, reaching 105.1 billion rubles at the end of 1980, or 87 percent of the year's capital investment volume. The rates of growth for labor productivity, profitability of contracting organization work, and yield on capital were reduced.

The chronic nature of the various deficiencies in the work of construction organizations requires that they be analyzed closely.

Great quantitative and qualitative changes have occurred in the development of construction, which has been transformed into a huge industrial branch of the national economy during the last decade. These changes must be considered in an analysis and evaluation of the builders' work and in determining areas of development for the long term.



The total amount of contracting work performed by state, cooperative and interfarm construction and installing organizations reached 72.4 billion rubles in 1980, increasing almost 1.6-fold over 1970's.

A distinctive feature of the 1970's was the forming of large regional production complexes, the scale and complexity of whose construction programs were unique in domestic and world experience. In this case, the integration of economic and social development of these regions, a mandatory prerequisite of which, as V. I. Lenin noted back in the first years of Soviet power, is the creation of "precisely the 'whole,' that is, not one economic activity, not one branch of the economy, not one enterprise, but the total of all the economic relationships, the total of all the economic turnover...." (Poln. sobr. soch. [Complete Collected Works], Vol 43, page 234), should be considered the principle point. Embracing many regions of the country, this process has become the main form for the accelerated development of productive forces, primarily in the Urals, Siberia, the Far East, Kazakhstan and Central Asia.

The scientific and technical revolution has led to a substantial increase in the degree to which enterprises under construction are being furnished modern industrial and power-engineering equipment, which is supplied by many plants of various branches of industry.

The enormous scale of capital investment, the multiple-branch nature of the industrial development of new regions and the increased intensiveness in the use of modern equipment have complicated construction's interbranch and intrabrand ties extraordinarily.

The existing forms and methods for organizing work, production activity and management in construction do not correspond with the new conditions, and they require a corresponding improvement. Special attention must be paid in so doing not only to objective factors but to the elimination of internal omissions and deficiencies in the activity of construction organizations that have exercised a negative influence on the increase in production effectiveness within the branch during the last five-year plan.

Based upon the capital construction program for 1981-1985, which was aimed at insuring balanced development of branches of the national economy and progressive changes in interbranch proportions, tasks have been set for construction organizations on introducing production capacity and facilities for nonproduction purposes into operation, on turning construction commodity output over to the client and on the amounts of contracting work required of them. Fulfillment of the program will be a serious test for the builders.

The five-year plan for 1981-1985 also calls for intense but realistic tasks for raising production effectiveness, speeding up the labor-productivity growth rate, and saving all types of resources in construction.

The branch's achieved productive potential, taking the material resources and capital investment earmarked for its further development into account, will enable fulfillment of the tasks that face the builders and an increase in the effectiveness of construction work, based upon an intensification thereof. However, realization of these tasks requires the elimination of existing deficiencies in technical policy and development of the branch and in the planning and economic incentives for construction production.

The most important principles for eliminating these deficiencies in capital construction and methods for improving the branch's economic mechanism were defined by the decisions of the 26th CPSU Congress and the November 1981 CPSU Central Committee Plenum, and they were disclosed in detail in the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979, "On the Improvement of Planning and Strengthening of the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality."

The direction of and the paths for improving the economic mechanism in construction are determined on the one hand by the principles and measures that are common to all branches of the national economy and, on the other, by the specific principles and measures that reflect the peculiarities of the branch's production work and its economics, and its condition and routes for development in ensuing periods.

The main general economic tasks for raising the level of planning and for improving the whole economic mechanism are oriented toward the integrated solution of economic and social problems, the concentration of efforts and resources on solving the most important national economic programs, acceleration of the introduction of the achievements of scientific and technical progress, the rational use of all resources, the correct determination of developmental priorities, and the forming of the necessary reserves.

The main directions for improving the organization and methods of planning are: the development of a single, mutually coordinated system for long-term and current plans; a further strengthening of the five-year plan's role and transformation of the plan at all levels of management into the basic form of planning and into a work program; the development and expansion of the use of specific-program methods for planning; a rise in the level of input-output economics work based upon an expansion of the systems of balances that have been developed and upon improvement of their interdependence; the justification of plan tasks by engineering and economic computations; the creation and subsequent introduction of a scientifically sound system of norms and standards; the orientation of planning to the final national-economic results; a rise in the effectiveness of production work and an intensification thereof; and a strengthening of the savings regime.

In order to improve the state of affairs in capital construction, a special system of measures, aside from those indicated, has been defined.

For purposes of planning the production-economics activity of ministries and agencies that are doing construction and installing work and the activity of construction and installing organizations, a unified system of indicators for construction production that have been confirmed in the five-year and in annual plans has been set for the first time. Its principal feature is its orientation to all construction participants to final national-economic results--the logical result of the aggregate of measures for improving capital construction.

The integrated execution of these measures should provide for a speedup of the introduction of production capacity and facilities into operation and a rise in capital investment effectiveness.

At the same time, the state of affairs indicates that the principles and measures called for by the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979, which determine the main paths for improving capital construction affairs, are being put into practice in the planning of construction production and

in the activity of contracting and other organizations and of participants in the construction process in less than full measure and not in integrated fashion.

The evaluation given by Comrade L. I. Brezhnev at the November 1981 CPSU Central Committee Plenum applies fully to the status of their realization: the decree on improvement of the economic mechanism is being introduced slowly and half-heartedly.

Thus, not enough attention is being paid yet to questions of improving the organization of and methods for planning. This relates in particular to the preparation of branch standard practices for planning, the organization of a precise procedure for developing plans at all levels of the economic system, the unifying of plan documentation, the creation of a scientifically grounded system of norms and standards for planning, and strict and unswerving observance of plan discipline. The various chapters of the consolidated plans of construction ministries and main construction administrations are being developed in some cases without the necessary coordination with other chapters and are poorly substantiated by the appropriate engineering and economic calculations. In developing stroyfinplan [construction-financing plans] within organizations, the requirement for coordination of the plan for technical development and for organizational and economic measures for saving labor costs with the plan for labor is mandatory, but at the main-administration and ministry level this principle is being ignored.

As yet there is, in practice, no good and complete standard practice for developing the five-year plan for construction and installing organizations. The existing recommendations are of a verbal descriptive nature and do not contain an example that is mutually coordinated from start to finish.

Up to the present, the procedures for the development and approval of plans and of the delivery thereof to plan executors at all stages and at all levels of management have not been unified.

The treatment of many procedural questions of planning in construction is at times approached from the standpoint of solving them in industry, which is often mistaken and incorrect. Thus, for example, it is scarcely possible, without a reshaping that will reflect the specifics of construction work, to apply to construction organizations the "Standard-Practice Instructions on the Procedure for Determining the Tautness of Plans," which was approved by USSR Gosplan on 15 January 1980.

Other examples can also be cited that will testify to the existence of "blank spaces" in the organization and procedures for planning construction-organization activity that arise from the general principles.

As is well known, the interdependence of the basic in-kind indicator of the plan, which characterizes the final result--the task for introducing production capacity and facilities into operation--with the cost indicators in the economic mechanism of construction production, is provided for by including the construction commodity output indicator among those that are mandatory. The content of this indicator, the procedures for computing it, and suggestions for improving the planning thereof have been publicized in this journal's pages.

Certain conclusions and generalizations can be drawn, based upon experience in the development of plans for construction commodity output for the current five-year plan and for the first 2 years of it.

First of all, it should be noted that the reporting data about the fulfillment of plans for introducing fixed capital into operation and about construction commodity output volume in regard to enterprises and jobs turned over to clients in 1981 have a high degree of convergence of results for most client ministries and agencies. This indicates that evaluating construction and installing organization work by the construction commodity output indicator correctly reflects the orientation of their activity toward the final results of construction operations. However, these results are below the level of fulfillment of the plan for contracting-work volume.

This is occasioned to a considerable extent by the fact that the introduction in 1981 of the principles called for by the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979 was still not complete, and, the main thing, not integrated. Thus, for example, the plans have not been provided with the required degree of balance of tasks for introducing fixed capital and production capacity and facilities into operation with the construction commodity output indicator. This is indicated, in particular, by the fact that in the initially approved 1981 plan the amounts of contracting work greatly exceed the construction commodity output indicator for many clients (Minkhimprom [Ministry of Chemical Industry], USSR Minugleprom [Ministry of Coal Industry], MPS [Ministry of Railways] and others). A situation that is similar but lesser in degree is characteristic also of plans for 1982 and the five-year plan.

According to the existing principles, construction commodity output is primarily the indicator for the contractor's plan. For the client, concern about the quality of the plan for construction commodity output is not paramount or determining. In order to eliminate the indicated abnormal situation, a decision was adopted to include construction commodity output in the indicators of the list of construction project titles, and a rise in the role of the construction commodity output indicator when contractors' agreements are concluded was called for. This action has enabled the quality of planning of construction commodity output to be improved, but it has not completely eliminated the noted deficiencies.

Because of this, it is necessary to take additional steps to raise the role of this indicator for all construction participants, and also to strengthen organizational and standard-practices work that provides for a real restructuring of the activity not only of contractors but also of clients, designers, and suppliers of equipment, structure and materials, with a view to increasing the orientation of their activity toward acceleration of achievement of the final results of capital construction.

The improvement of planning construction commodity output requires a strengthening of the quality requirements of the design and budget-estimating papers that are developed, correct determination of the composition of the complexes due for early startup, the mandatory singling out of all types of construction commodity output, and the authentic reflection thereof in designs, budget estimates and lists of construction project titles.

It is necessary to refine and to render more concrete the procedures for planning construction commodity output for shared assignments and also to formalize the procedure for refining plans for construction commodity output where there are changes in the established procedure for plans for contracting work.

Because of the lack of design and budget-estimating documentation for construction projects for production purposes, and, in some cases, of a listing of names for

housing construction and other facilities for nonproduction purposes that are to be newly started in 1983-1985, the construction commodity output indicators for these years have been determined in the five-year plan only by estimation and should be refined for the annual plans. Therefore, a strengthening of the role of the five-year plan will not in any way signify a reduction in the requirements for procedures, deadlines, and quality in the development of annual plans. In so doing, while questions of coordinating the amounts of contracting work predominate when the five-year plan is being drawn up, the center of gravity is shifted to coordination of the refined amounts of construction commodity output, when annual plans are being developed, with the provisos of the approved five-year plan.

In orienting construction organizations to the achievement of final results, great significance is attributed to converting to the planning of labor productivity in accordance with the norm for standard-equivalent net output (NUChP). The content of the norm for standard-equivalent net output and the procedure for computing this indicator in construction have been defined by the appropriate standard-practices documents and have been widely publicized in EKONOMIKA STROITEL'STVA's pages.

However, in some cases the norm for standard-equivalent net output, as is the case with construction commodity output, is contrasted with the amount of construction and installing operations, which is completely unjustified. The combination of the indicated cost indicators and of tasks for introducing production capacity and facilities should be regarded as a mutually coordinated system of indicators for construction production, which meets the requirements for the improvement of capital-construction planning and of the production-economics activity of construction and installing organizations in accordance with the principles defined in CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979.

The merits of any generalized indicator, especially a generalized cost indicator, is not realized automatically when it is used in an economic-mechanism system. Moreover, the prerequisites necessary for forestalling the possibility of the appearance of this indicator's negative results should be created.

These principles apply also to the NUChP indicator, which is not a homogeneous indicator. The effect of the corresponding structural shifts can lead, when it is used, to distortion in the evaluation of an activity. Therefore, the search for new, generalizing measures of production volume can scarcely be regarded as ended.

Great complexities have been linked with determination of the planned construction and installing work volume in accordance with the norm for standard-equivalent net output if this indicator is viewed as a start-to-finish indicator for all elements taken together, from the lower productive elements to the higher ones and broken down from the higher elements to the lower ones. There are two possible variants here: the standards method and direct calculation by job simultaneously with formulation of the plan for construction commodity output and of the contracting work.

The latter method provides for obtaining a more authentic result, but it involves the need to solve complicated questions of planning technology, since the inclusion of this indicator in the existing Form No 4-pks, the source for forming the planned load on the construction and installing organization, is in practice scarcely realizable because of the extraordinary overload by other indicators, and the development of a parallel source form for planning NUChP will make planning work more difficult and increase the amount thereof.

The standards method requires the creation of an appropriate system of plan standards that are put together by level of planning and the solution of some complicated procedural questions of combining the results of plan calculations during the conversion from one hierarchical level of planning to another. Moreover, the standards method reduces down in essence to a structural adjustment to the amount of work in accordance with the budget-estimated cost.

The method of planning work volume by NUCHP in the form of the development of a recurring plan which has been proposed by some economists also has major deficiencies, which were noted in previously conducted experiments.

Right now, therefore, during the planned large-scale conversion of construction organizations to planning labor productivity by the NUCHP indicator, the need for generalization of the practice of its use in organizations that have converted to this procedure by way of experiment and the development, based thereon, of unified standard-practice principles become especially important.

Simultaneously, it must be noted that with any methods for evaluating the labor productivity level a question of paramount importance is the existence of a scientifically validated procedure for planning the rate of its growth. The currently existing procedure for planning labor productivity growth, which is founded on computations of labor expenditures savings by factor, should be refined and rendered more specific from the standpoint of a modern evaluation of the directions of the technical development of construction and improvement in work organization and in production and management. Construction production can be intensified during the 11th Five-Year Plan only on the basis of qualitative changes in technical policy that correspond to the modern level of development of science, equipment and technology.

Given the enormous scale of capital investment and the dynamicity and unevenness of growth in the amount of construction and installing work by individual region of the country, questions of coordinating capital construction plans with construction and installing organization capacity become extremely urgent. This is confirmed, in particular, by the fact that the major portion of the amounts of construction and installing work underfulfilled by the main contracting ministries during the last five-year plan occurred in regions of concentrated construction that have a high rate of growth in work volume.

In order to provide for balance in the plan of work volume with the capacity of construction and installing organizations, it is necessary to evaluate correctly the actual capacity of existing organizations and to work out real measures for bringing them up to the level necessary for carrying out the intended amounts of contracting work.

Despite the fact that questions of procedure for determining the productive capacity of construction and installing organizations have been long discussed by economists, engineers and technicians, a unified opinion has not been developed yet for many of its principles.

Under these circumstances, USSR Gosplan, USSR Gosstroy and USSR TsSU [Central Statistical Administration] adopted a decision in May 1981 about guidelines for practical use for ministries and agencies, "Temporary Standard-Practice Recommendations for Defining and Planning Development of the Productive Capacity of Construction and Installing Organizations." This was worked out by NIIES [Scientific-Research

Research Institute for Construction Economics] of USSR Gosstroy and NIIOUS [Scientific-Research Institute for Organizing Construction Management] under MISI [Moscow Construction-Engineering Institute imeni V. V. Kuybyshev] and was founded upon integrated calculation of the capacity of the construction and installing organization, based upon its machinery and labor resources. In considering that the methodology is of a recommended nature, the ministries must be given the right to add specificity to the general principles it stipulates, taking into account the specific peculiarities of the production activity of subordinate organizations. Thus, for the specialized ministries that have a high level of technical equipping, it is desirable that capacity be computed on the basis of the amount of mechanized resources used and their potential productivity, or be computed in integral according to the amount of the active portion of fixed productive capital and the potential yield on capital.

Many critical remarks have been expressed on the recommended methodology for determining capacity. For the sake of objectivity it can be said that even more remarks could have been made. However, this should scarcely be the basis for asserting that the use of the various branch methodologies that the ministries have developed cannot insure a balancing of the amounts of construction and installing work with the capacity of the construction and installing organizations.

In examining questions of balancing production volume with production capacity, it should be emphasized that the principle of balancing cannot be reduced down to a simple requirement to refrain from planning for a construction and installing organization an amount of contracting work that exceeds the actual capacity of that organization, taking into account an improvement of its utilization during the plan period. In planning practice, cases can occur where the interests of developing the national economy will lead to a need for a construction and installing organization to carry out in the plan period a work volume that exceeds the actual capacity, taking into account improvements in its utilization, and, consequently, to a necessity for a corresponding buildup of existing capacity.

This question also relates to a number of questions that are resolved with greater difficulty under practical conditions. A boosted increase in substantial amounts of fixed production resources, such as construction equipment and worker personnel, and also, in many cases, even capacity for the output of constructional structure, requires the development and realization of special measures. Experience from the last five-year plan indicates that this work has been done with insufficient persistence and purposefulness in the construction ministries, as indicated, in particular, by the fact that the lists of overloaded regions hardly changes from year to year, but the amounts of work carried out in these regions grows practically not at all, or grows at an inadequately rapid rate. Measures for creating mobile organizations in the main general contracting ministries, making wide use of the rotating-personnel expeditionary method of operation and expanding the scale of outfitted-module construction, have been aimed at solving this problem. However, practical realization of these and other measures that are aimed at improving the solution of questions of a forced buildup of construction and installing organization capacity in the required regions still has been accomplished unsatisfactorily, as a rule.

When formulating a production program, the prerequisite of establishing priorities is continuously linked with the principle of insuring a balance of capital-construction volume with construction and installing organization capacity. The CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979 and

the decisions of the 26th CPSU Congress and the November 1981 CPSU Central Committee Plenum noted the necessity for intensifying specific-program methods in planning and management. Funds and resources should be concentrated primarily on solving the most important national-economic integrated and specific-purpose programs, programs for establishing regional production complexes and for developing various branches. The main construction projects of the 11th Five-Year Plan, which are called for by the most important programs, have been defined for each construction ministry and its organizations as a whole and for the appropriate region. The execution of operations at these construction projects in the amounts necessary for introducing them into operation by the deadlines established in the plan should be provided for primarily by construction and installing organization capacity.

The coordination in construction ministry plans of the amounts of contracting work and the amounts of output of their industrial enterprises and subsidiary production facilities is of great importance in insuring a balance of capital construction plans with the potential of the construction and installing organizations. The construction ministries' industry produces basically constructional structure, parts, components and materials for internal use, and a noncorrespondence in the rate of growth of this output with contracting operations plans predestines tenseness in the supplying of materials and equipment, and this cannot help but be telling on the fulfillment of these plans. This relates in equal measure also to planning the output of subsidiary production facilities of construction and installing organizations, which provide a substantial portion of the requirement for concrete, mortar, quarried constructional materials, prefabricated concrete and reinforced-concrete structure, lumber, metal constructional structure, nonstandardized equipment, intermediate sanitary-engineering articles, and other types of output. All management levels must change radically their approach to planning the output of products, by both the industrial enterprises of the construction ministries and the subsidiary production facilities of construction organizations, with a view to insuring close coordination of the amounts of their production with the planned amounts of contracting work.

The orientation of construction organizations to the final results of construction production under modern conditions is unthinkable without a corresponding restructuring of the organizational forms of management. The concentration of production in large construction formations should be considered the main direction here. It is not just a matter of calling the formations production-type construction and installing associations or trusts, and it is obvious that not in all cases is the form of the production-type construction and installing associations acceptable. It is not these points that are important in solving this question but the fact that it is impossible to realize the new demands made on economic supervision within the framework of the old trusts.

An analysis of the economic indicators of construction and installing organization work and the fulfillment by these organizations of tasks for introducing production capacity and facilities proves convincingly the advantages of large construction formations. Thus, for example, based upon the results of an analysis of the fulfillment of plans for introducing production capacity, construction commodity (formerly realized) output, profit, amount of contracting work, labor productivity, reduction of prime cost, average wage and level of material incentives for 120 Mintransstroy [Ministry of Transport Construction] trusts that was conducted for recent years, it turned out that the highest production effectiveness is **provided in organizations with a capacity of at least 30-35 million rubles' worth of work**



performed by their own forces. These are only about 40 percent of the ministry's organizations.

Most of the existing trusts do not meet the new requirements and tasks, either in the structure and composition of the subunits or in the structure of their management staff. The bottlenecks are engineering preparation for production, the supplying of complete sets of equipment to construction projects, introduction of the achievements of science and technology into production, and the organization of normal cost accounting interrelationships and other elements of the trust's production-economics activity.

It stands to reason that in questions of consolidation and the creation of high capacity construction formations there should be no hard and fast pattern, and the mistakes that have been committed in the industry should be considered. In conducting this work, it is necessary to consider specialization, the level of cooperative arrangements, the degree of regional dispersion of the facilities being built, the presence of an in-house production base, and other features of construction organization activity. In all the construction ministries there are many positive examples of the restructuring of the organizational structures of management that have proved themselves well in practice. The dissemination of advanced experience to all organizations is slowed often not by any kind of objective circumstances but by an attachment to traditional methods and forms of management.

It is completely pertinent here to recall V. I. Lenin's words: "...when a situation has changed and we must resolve tasks of another kind, then it is impossible here to look back and try to solve them by yesterday's method. If you do not try, you do not solve them!" (Poln. sobr. soch., Vol 44, page 324).

Practical execution of the policy of raising the effectiveness and intensity of production is linked in all branches of the national economy with the search for new solutions and new approaches. Integration should be an indispensable prerequisite in this case. Only integrated realization of the principles of the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979 will enable the intended results to be achieved.

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## CONSTRUCTION

### NEW BELORUSSIAN CONSTRUCTION-MANAGEMENT SYSTEM HAUNTED BY OLD CRITERIA

#### Loopholes Pointed Out

Moscow PRAVDA in Russian 28 Dec 81 p 2

[Article by Vyacheslav Goncharov: "Commodity Output in Construction"]

[Text] In 1975 Belorussian SSR Minpromstroy [Ministry of Industrial Construction] began an experiment that is believed to have laid a new path for increasing effectiveness in construction. Its essence lies basically in making the final results--jobs turned over for operation that must be ready to produce output or extend services--the basis for planning and for evaluating the activity of construction and installing organizations.

The experiment succeeded. During the 10th Five-Year Plan the average rate of growth of commodity output for the ministry exceeded 15 percent, which was twice as fast as growth of the "gross." This means that uncompleted construction had been reduced and there were fewer construction projects "with beards." A fifth of the jobs erected were turned over ahead of schedule. The experiment was repeated in other construction subunits. Those were the results. And now, with the first years of the 11th Five-Year Plan, and in accordance with a well-known CPSU Central Committee and USSR Council of Ministers decree, basically all the country's builders have received a plan for turnover of commodity output. What do the results of the work indicate?

#### The First Changes

Who among us has not seen an abandoned construction project, overgrown with thick weeds, whose stillness is disturbed solely by the carefree twittering of sparrows? If we start to ask about some heap or object, people will shrug their shoulders at you. It is recalled, they will say, that they worked two shifts here. But they built the building up as far as the roof and left. Why?

The builders willingly did the initial, expensive, materials-intensive work, but then, under any pretext, they strove, if not to leave entirely, then at least to leave fewer people for the decorating and finishing-up work, the most labor-intensive operations, the contribution of which to the total cost purse is always the least significant. The "gross" had roused them to excavate foundation pits, erect walls and use expensive materials. Forces and resources were dispersed, and this, from the state's point of view, was clear wastefulness and mismanagement.

The spread of this undesirable phenomenon was aided by the fact that in some oblasts ever newer footings were being laid without a consideration of the actual possibilities. They acted on the principle: there will be a backlog of work starts, and then sometime we will "take it into our heads to complete it."

Today, the plan for commodity output guides builders primarily toward introducing jobs into operation more rapidly.

The results of the experiment in Belorussia have already been mentioned. Comrade L. I. Brezhnev's speech at the November 1981 CPSU Central Committee Plenum gave a high evaluation to the work of Leningrad Glavzapstroy [Main Administration for Construction in the Western Economic Region], whose collective converted to the new terms almost 4 years ago. Last year alone the Leningraders turned over 10 items of production capacity and facilities ahead of schedule. And today their job record is enviable.

Here are the results of the activity of Glavmosinzhstroy [Main Administration for the Erection of Engineering Structures in the City of Moscow], which converted to commodity-output planning back in 1977. Annual commodity output rose almost 1½-fold during this time, the amount of construction and installing work, that is, the "gross," about 1.1-fold. The figures speak for themselves: uncompleted construction began to "melt." Yield on capital investment speeded up.

Can it be, all the same, that this occurred by chance? Nothing of the sort. USSR Stroybank recently checked the work of 173 construction trusts of various ministries and confirmed that such a trend exists, but on an even larger scale. There has been a remarkable concentration of efforts and resources on projects due for early startup, and uncompleted construction has been reduced.

And there are hundreds of fewer jobs in the 1982 plans for these collectives than there were this year.

These shifts would have been far more modest, of course, without the simultaneous introduction of the new procedure for financing "uncompleted construction." The builders previously used the clients' advances for this purpose. Now they use bank credits. This has strengthened ruble control over the quality and comprehensiveness of the design and budget-estimating documentation, the substantiation of capital investment and construction-project title lists, and the reliability of financing sources on the part of clients.

At the start of the year I happened to be a witness to a genuine storming of the manager of the Volgogradskaya Oblast Office of USSR Stroybank, A. Makarov, by contractors and clients. But the manager was impervious: put the papers in order and then you will be welcome. Nineteen newly started complexes and facilities with a budget-estimated cost of 242 million rubles did not find their way into the plan. Then they were able to increase the original program for commodity output here by 15 million rubles.

But still there are those who seriously think that the new indicator works by itself. At a recent All-Union economic conference, an anecdotal fact was cited literally. One perplexed economic worker tried to get an answer from scientists on this question--why, even with conversion to standard net output, had the materials intensiveness of articles not been reduced? And they answered: because nothing had been done in this direction.

## Do Not Adapt It

The same can also be said about construction. Where adequate attention is paid to jobs due for early startup and to the regularity of their turnover for operation by quarter, there will be commodity output. And recognition will follow. However, have fear of the adapters. They can ruin any new matters. Take, for instance, the brigade contract. In many places they "adapted" it right off to their own idea, to the old attitude toward the matter. And it remains a progressive form of work organization and production in name only in some places.

I once ran across this case in the city of Volzhsk. A new school was being built. All the work, beginning with the pile-driving, was performed under contract. Some thousands of rubles of bonuses were paid out for successful fulfillment of the contract. But the school was turned over for operation with great delay--not until October. Why? The brigades were undermanned and narrowly specialized. They did "their" job honestly and rapidly. But the gap between them, caused by organizational uncoordination, was ever-increasing, and construction lagged. The chief cause was that the brigades did not have the most rapid turnover of the whole facility as their common purpose.

Why was this instance recalled? The point is that in this way they adapted even the commodity-output indicator to the old work style. At the start of the year, the Volgogradskaya Oblast Office of USSR Gosbank showed me the list of construction-project titles for a new sprinkler-irrigation system, where the commodity output was dispersed over numerous small complexes. What for? Commodity output can be made up through secondary facilities.

Unfortunately, such cases are not isolated. A check has shown that some construction ministries are adjusting the cost of the complexes due for early startup to the amounts of capital investment that have been allocated but are excluding from the commodity output auxiliary, servicing and domestic-amenity facilities and, at times, even facilities without which the capacity due for early startup cannot operate.

Out of 686 construction projects investigated by USSR Stroybank, the planned volume of construction commodity output for 252 construction projects will not provide for full completion and turnover into operation of the production capacity and facilities called for by the plan. Here are examples. In the list of construction-project titles for the current year, USSR Minchermet [Ministry of Ferrous Metallurgy] planned to put a sheet-iron department of 445,000 tons per year of capacity into operation at the Karaganda Metallurgical Combine. The amount of construction product was 210 million rubles, but in the plan for contract work this commodity output was reduced to 187 million rubles, and in the list of construction-project titles to 155.9 million rubles. The explanation here was simple: USSR Minchermet and USSR Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] broke the startup complex into smaller units, and they excluded 24 facilities for auxiliary purposes from them.

Capacity for producing 51.5 million m<sup>2</sup> of finished textiles was introduced at the blended spinning and weaving mill of USSR Minlegprom [Ministry of Light Industry] at Lutsk, Ukrainian SSR. However, they "forgot" to include in the startup complex a transformer substation and flotation-condensation tank.

Why this time-serving, this juggling of figures? With this approach to matters, it is entirely possible to stick to the basic indicator, even if you somehow do not introduce the main job.

But there are even deeper sources that impel the builders to such dodges. They will lose credits, for which they will have to pay, for uncompleted construction. A half of one percent until the planned deadline for turnover of the facility. If it has not been coped with, kindly unburden yourself of 8-fold more. This threatens serious financial difficulties--an appreciable reduction of profit and economic incentive funds, overexpenditure of the wage fund, and so on.

At first glance, everything is seemingly correct. A plan is a plan, and be good enough to stay within the plan schedule. However--stop! Indeed, does the rhythm of the construction assembly line today depend just on the builders? On every hand, clients, designers, suppliers and transport workers are letting them down. And the general contractor is even forking over these days for foreign blunders. And so he has also begun to seek a way out of this really difficult situation. It is desirable that USSR Gosplan and USSR Gosstroy set matters right as quickly as possible and provide for the guaranteed responsibility of each of the builders' partners for the final work result. Friendship is friendship, but, as they say, a smoke is something else!

Then there are also more basic questions. Today some are saying: just what in particular has changed? The "gross" is all decked out in a ready-made suit, and now you must have, please, commodity output. That same cost indicator that is tightly linked to the budget-estimated cost of construction and to materials. That means the dearer the project the better? It turns out that way. So today labor productivity and the wage fund depend completely upon its magnitude--the "gross." And so for the present there have been no changes. Thus it happens even today that, behind the scenes, the repudiated indicator still guides the activity of whole collectives into an undesirable channel. As before, it is advantageous to use the most expensive materials. The indicators will be better, more resources will go into the incentive funds, and bonuses will grow.

Today, as many economists complain, during the most difficult period--at the conclusion of construction, when the labor intensiveness of the work is increasing and the amount of funds being assimilated drops, one has to rack one's brains, instead of digging superfluous foundation pits and laying footings. Otherwise your troubles will never end.

#### From Words to Deeds

A situation that clearly is not normal has been existing. The mechanism for planning has scarcely improved, and there has been no escaping from old mistakes. Why did this happen? The fact is that USSR Gosplan and USSR Gosstroy have not had an integrated approach to solution of the problem put to them. Simultaneously with the conversion of builders to commodity output it was also necessary to introduce new calculations for labor productivity and for the wage fund--as a function of standard-equivalent net output. And everything would have fallen into place.

However, these most important measures have actually been spread out in time. This year higher authorities have determined finally only the procedure for converting to planning labor productivity in accordance with standard-equivalent net output--

NUChP. In construction organizations it will be effective starting only in....1984. But the testimony of economists indicates that neither will the new indicator be rid completely of the influence of the materials, that is, of past labor. The influence of this will not be as great as before, let's say, but carryover of the advantages of that labor will be preserved. Let's say overhead expenditures--a component part of NUChP--are figured as percents of direct expenditures. This means that the greater the materials intensiveness, the greater they also will become. New standards that are more precise are needed here.

For these reasons, the new indicator still has not become evaluative to a great extent for the builders as the 12 July 1979 decree of the CPSU Central Committee and the USSR Council of Ministers requires. Hence the disregard of it by many construction ministries. How, let's say, do you evaluate USSR Mintyazhstroy's work if the plan for total amount of commodity output was fulfilled during the first 11 months of the year by only...36 percent? Minvostokstroy [Ministry of Construction in the Eastern Regions] also enjoys such "successes." The plan for this period was carried out by less than 50 percent by USSR Minpromstroy [Ministry of Industrial Construction], USSR Minsel'stroy [Ministry of Rural Construction], USSR Minstroy [Ministry of Construction] and others. This means that in December there will be crash work, which will lead to a reduction in work quality.

In brief, planning for commodity output as yet has only burdened economists with extra work, without leading to comprehensive shifts in the state of affairs itself, the organization of construction work, and its rhythmicity. Incidentally, primarily through the fault of USSR Gosplan and the clients, some ministries' crash work occurred in December as if it had been planned. Thus, the planned introduction of commodity by Mintransstroy [Ministry of Transport Construction] was, for the first quarter, only...3 percent of the annual plan but it was 71 percent for the last quarter, and for USSR Mintyazhstroy the figures were, respectively, 5 and 62 percent.

...In speaking at the November 1981 CPSU Central Committee Plenum, Comrade L. I. Brezhnev said: "The congress put forth the slogan, 'The economy should be economical.' The whole economic mechanism should be brought into accord with this requirement. But, it must be confessed, this still has not been done in the proper measure....That is why we still have not managed to escape from those indicators that, in essence, encourage wastefulness. We have in mind the notorious 'gross,' which is figured in tons or rubles...."

All right, this is a word for USSR Gosplan and USSR Gosstroy. But it is time now to convert from words to deeds.

#### Old Indicators Still Influential

Moscow PRAVDA in Russian 5 Mar 82 p 2

[Article by V. Yevtukh, chairman of Belorussian SSR Gosstroy (Minsk): "The Experiment Confirms"]

[Text] One of the major measures aimed at improving the economic mechanism in construction is the so-called Belorussian experiment. It was conducted over a period of 6 years, and certain advantages of it appeared, but along with these, difficulties

also were revealed which innovators encountered while introducing the progressive methods of operation. It would seem that it makes sense to discuss this in more detail.

First of all I will recall the essence of the experiment. It was conducted by the Ministry of Industrial Construction and the Ministry of Installation and Special Construction Work of the republic and it was aimed primarily at speeding up the introduction of production capacity and of production facilities. In order to encourage reduction in the time taken to erect them, settlements between clients and contracting organizations were to be made for ready-to-use facilities, instead of payments for separate stages of construction. Construction commodity output became the most important indicator of the work of contracting construction and installing organizations. The system for financing contractors also was changed, and their expenses prior to the full completion of construction were to be covered by bank credits. However, interest for the use of the credits was differentiated--an extremely important factor. It was reduced if the facility was introduced ahead of schedule and increased if the established deadline for construction was not met.

The many years of the republic's experience indicated that the construction assembly line was speeded up appreciably. During the 10th Five-Year Plan the time that Belorussian Minpromstroy took to erect facilities was reduced by 13 percent, while for construction projects for production purposes--where the reserves were greater--it was cut by 17 percent. The number of facilities turned over to clients increased by 37 percent over the Ninth Five-Year Plan and 750,000 m<sup>2</sup> more of housing were introduced. The amount of uncompleted construction was reduced somewhat. Last year the erection of a number of large facilities for light industry was completed ahead of time, for which Comrade L. I. Brezhnev warmly congratulated Belorussia's builders.

The experiment's positive results enabled its basic principles to be extended to the whole construction branch. The system of settlements for final results, with credits granted for intermediate expenditures, was also used in design organizations and by clients and the general suppliers of equipment. And yet, unfortunately, such participants of the construction process as supplying and transporting organizations still remain outside the jurisdiction of the new economic mechanism, although the timely introduction of capacity and of facilities depends to no small extent upon them. Experience requires changes here also, and that is why we have sent Union organs a proposal that these organizations be converted to a settlement system close to that which the builders are using. It would seem that it is in the interests of the matter that this proposal be examined as quickly as possible.

During the experiment the question of economic incentives for those who are thrifty sharpened. The fact is that under the existing system for budget-estimated price-setting and planning, workers of construction, installing and design organizations have not been highly motivated to reduce the resource-intensiveness of construction during the stage at which facilities are designed. Why? Along with the introduction of facilities into operation, the main evaluative indicator of the activity of contracting organizations is still the commodity construction output volume, and it is to a great extent (up to 60 percent) shaped by the cost of the material resources. It turns out that the higher the budget-estimated cost of the facility, the...more advantageous the construction. Yet, on the contrary, every reduction of cost of the indicated resources from, let's say, the application of economical design solutions leads to a reduction in construction commodity output volume, and, in turn, to a reduction in profit and economic incentive funds.

This case can be mentioned for clarity. A spinning and weaving factory was being built in the town of Korbin. The prime contractor--Belorussian SSR Minpromstroy--concurred in the use of "dinakor"-type cased slab as structure for the roof of the main building, and in the use of centrifuge-cast columns. Reinforced-concrete consumption was reduced 3,500 m<sup>3</sup>, and 800 tons of metal and 1,300 tons of cement were saved. The budget-estimated cost of the construction and installing work was reduced by 570,000 rubles, or by 7.6 percent. This is a benefit to the national economy. And what did the builders who created the new structure, who mastered the production and erection thereof, "win"? For these purposes they spent no small amount from the fund for new equipment. But it turned out that it was not enough to cover the expenditures. If they had designed the facility for traditional materials-intensive structure, the commodity output would have been 570,000 rubles greater. And the following would have been higher: profit by 70,000 rubles, the wage fund by 137,000 rubles, and the economic incentive fund by 22,000 rubles. It turned out that the builders were the losers. That is why they often refuse to agree with effective design solutions.

It is something else when the design has already been adopted by the contracting organization and there is a possibility to rationalize its various solutions. In this case a reduction in expenditures on the facility will not harm the contractor's interests: for it is not accompanied by a reduction in the amount of construction commodity output. It is true that such a rationalization cannot be considered as effective, since the builders do not have enough time left for substantial changes.

It is not always advantageous to design institutes that they use the new method. For the use of effective structure and progressive solutions more often than not results in increased expenditure of the work of specialists. At the same time, the reported amount of design output and the indicators derived therefrom are lowered to the extent that the amount of the budget-estimated cost of the construction and installing work is reduced.

In considering this, we have contemplated measures aimed at strengthening the incentives of design and contracting organization workers to realize scientific and technical achievements and to reduce the consumption of production resources. In particular, we proposed to make these dependent upon the material funds realized by construction organizations and on the transport services extended, in the variety and in accordance with the deadlines stipulated in the agreements. It is also proposed to grant them bank credits, with a corresponding payment for its use.

Stable prices per unit of final construction product (let's say, per square meter of housing or per cubic meter of production buildings) will be the basis for the innovation. Prices will be differentiated as a function of their class categories in regard to their longevity, comfort and other features.

Stable prices are to be used not only in settling with clients but also in planning and evaluating the work of design and contracting organizations. The difference between the cost of the facility according to the stable price and its cost according to the budget estimate and a progressive variant of the working drawings will become the source of additional profit. A part of this profit will be deducted into the state budget, but the rest will become the source of economic incentives for collectives and of reimbursement for the expenditures for the introduction of



the innovations. It is planned to use this procedure at a number of facilities in the near future.

Development of the experiment will, in our view, help to intensify the motivation of production collectives to use the achievements of scientific and technical progress and to increase the effectiveness of all operations in construction.

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## METALWORKING EQUIPMENT

### MACHINE TOOL, TOOL BUILDING INDUSTRY MINISTER ON TARGETS IN 11TH FIVE-YEAR PLAN

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 5, May 82 (signed to press 26 Apr 82) pp 3-16

[Article by B. Bal'mont, Minister of Machine Tool and Tool Building Industry: "Machine Tool and Tool Building Industry in the 11th Five-Year Plan"]

[Text] In carrying out the resolutions of the 26th CPSU Congress, the Soviet people, under the leadership of the Leninist Party, ensured continued growth in the economy and well-being of the people in the first year of the 11th Five-Year Plan. National income increased 3.2 percent during the year, to 474 billion rubles. Industrial output increased by 21 billion rubles, or by 3.4 percent, to 643 billion rubles (in enterprise wholesale prices as of 1 January 1975). Fixed assets with a total value of about 135 billion rubles were put into operation in the national economy. About 200 large new industrial enterprises began operating. The labor of 2.5 million people was saved through increased social labor productivity.

Machinebuilding, the key branch of the economy, developed dynamically. Machinebuilding and metalworking production volume increased six percent over 1980. Machine tool industry also increased commodity output production volume by six percent and ensured five-percent labor productivity growth.

In machinebuilding, we completed construction of projects in the second line of the Kamskiy Large-Vehicle Association, which is equipped almost totally with domestic metalworking equipment. Capacities to produce machine tools and forging-pressing machines have been increased. About 11,000 mechanized automated and flow lines have been installed at the country's industrial enterprises.

The national economy received 2.641 billion rubles worth of metalworking equipment, or 5.3 percent more than in 1980. Ten thousand numerical preset-control machine tools were manufactured. Specialized machine-tool plants developed 628 complete automated and semiautomatic lines for various branches of industry in 1981, including 361 lines for machinebuilding production. Some 33,000 special, specialized and unitized machine tools were produced. The national economy was supplied with 15,000 high-precision and superhigh-precision machine tools and 3,400 heavy-duty and single-purpose metalworking equipment units. More than one billion rubles worth of various tools was manufactured.

Work continued on developing and mastering new types of equipment. During the year, organizations and enterprises made and tested 700 new models of equipment and tools; they mastered 568 reference series of items and withdrew 154 items of obsolete design

from production. Given a plan of 41.5 percent, 44.6 percent of all commodity-output production was output in the highest quality category. The state Badge of Quality was awarded to 258 items for the first time.

By using production reserves, the collectives of many associations, enterprises and organizations overfulfilled the plan and finished the first year of the five-year plan with high economic indicators. Based on All-Union Socialist Competition results, 11 collectives were awarded challenge Red Banners of the CPSU Central Committee, USSR Council of Ministers, AUCCTU and Komsomol Central Committee. They included "Stankostroitel'nyy zavod imeni Sergo Ordzhonikidze" association, "Krasnyy proletariy" association, Zaporozh'ye Abrasives Combine imeni 50th Anniversary of the Soviet Ukraine, Vitebsk Machine Tool Plant imeni S. M. Kirov, the All-Union Scientific Research and Technological Design Institute of Natural Diamonds and Tools, and others.

At the same time, the branch did not carry out state plan assignments in full in terms of individual types of metalworking equipment. A number of enterprises permitted lag in implementing delivery agreements. Individual production associations and enterprises were later than planned in preparing production to release new items. The plan for capital construction and putting fixed assets and production capacities into operation was not carried out.

The plans for branch economic development and scientific-technical progress in the 11th Five-Year Plan have been worked out in accordance with the tasks set by the 26th CPSU Congress concerning outstripping development of machinebuilding and metalworking and improving their effectiveness. Their implementation is based on the production-technical potential which has been created in machine-tool building, on use of the available and developing scientific-technical stocks and on utilization of production capacities being put into operation.

The role of machinebuilding in retooling the national economy and increasing the availability of capital to labor is increasing in the resolution of the tasks put forward by the 26th CPSU Congress on accelerating scientific-technical progress and increasing the efficiency of social production. As L. I. Brezhnev noted at the November (1981) CPSU Central Committee Plenum, the tempo of equipment up-dating will increase approximately 1.5-fold in the current five-year plan.

The "Basic Directions of USSR Economic and Social Development in 1981-1985 and Up To 1990" set large-scale new tasks for machinebuilding and the mainlines of technical progress and increasing machinebuilding production efficiency. Given 18-percent national income growth and 29-percent industrial production growth in the 11th Five-Year Plan, we anticipate increasing machinebuilding output volume 1.4-fold, which will ensure upwards of 40 percent of the entire increment in industrial output. The release of machinery and equipment to mechanize and automate all branches of the national economy will be increased at a more rapid rate.

Interlinked equipment complexes and machine systems are being developed and created. We are resolving the tasks of increasing machinery and equipment unit power within optimum limits while simultaneously reducing their size, metals-intensiveness and energy consumption and while lowering cost per unit of useful end result. The intensive path of machinebuilding and metalworking development is based on continued enterprise retooling and the more efficient use of fixed production assets and labor and material resources. The continuous improvement and intensification of branch and

interbranch specialization and the introduction of progressive technology, especially low-waste and energy-conserving technology, entail substantial changes in the structure of the metalworking equipment fleet.

The development of machinebuilding and increasing its effectiveness are linked foremost to progress in domestic machine tool and tool-building industry. Whereas the materialization of scientific and technical progress on a national economic scale depends on machinebuilding, the production and technical opportunities of machinebuilding itself depend on machine-tool manufacture.

Soviet machine-tool and tool-building industry is a production-technical complex which includes a number of subbranches which differ in terms of the equipment they produce and in production-technological criteria. Its main subbranches are machine-tool manufacture, forging-pressing machinebuilding, foundry machinebuilding, wood-processing machinebuilding, tool industry and the production of abrasives and diamond tools. Machine-tool manufacturing also includes interbranch subbranches producing general machinebuilding items such as cast blanks, stampings, welded components, hydraulic equipment, fasteners, and so forth.

The features of machine-tool industry determined by the demands of machinebuilding production are the fact that the output being manufactured belongs to many products lists and the fact that production is small-series and series in nature. Machine tool manufacturing produces approximately 1,750 type-sizes of standardized and 5,500 to 6,000 models of special, specialized and unitized machine tools; 525 type-sizes of multipurpose and upwards of 1,500 special forging and pressing equipment are produced by forging-pressing machinebuilding; 100 multipurpose machines are produced by foundry machinebuilding, and wood-processing machinebuilding produces more than 400 models of multipurpose machine tools and equipment.

The tempo and scope of expanded machinebuilding reproduction and the retooling, renovation and expansion of existing enterprises anticipated by the 1981-1985 State Plan of USSR Economic and Social Development determine the orientation of economic and technical policy and the concrete tasks of machine-tool and tool-making industry in the 11th Five-Year Plan. We are faced with attaining two interconnected goals. We need first of all to improve the structure of the metalworking equipment fleet in machinebuilding by reducing the production of multipurpose machine tools and machinery and expanding the release of highly productive special and unitized machine tools, progressive forging-pressing equipment, and automated lines and complexes. We need to have increased machine tool productivity 1.5- to 1.6-fold by 1986 as compared with the level in the 10th Five-Year Plan, forging-pressing machinery and foundry equipment productivity 1.4- to 1.5-fold, wood-processing equipment productivity 1.3- to 1.4-fold, and machining precision on machine tools 1.2- to 1.3-fold. Moreover, it is important to improve the reliability and durability of machine tools, forging-pressing machinery, foundry and wood-processing equipment 1.4- to 1.6-fold.

The technical policy being implemented in the branch finds concrete expression in the outstripping development of equipment for blank production and a broad products list of automated and semiautomatic metalworking equipment for all the technological subdivisions of machinebuilding production. Machine tool production in 1985 is to have increased 40.6 percent as compared with 1980 (in cost terms), forging-pressing machinery production -- 44.8 percent and foundry equipment production -- 41.5 percent.

The growth in the amounts of metal being processed in machinebuilding and the necessity of raising its use coefficient demand further improvement in the production structure and raising the technical level of forging-pressing equipment, increasing the proportion of machinery for low-waste and waste-free technological processes, and primarily automatic equipment, means of automation and mechanization, automated and semiautomatic lines, machinery with numerical preset control and those equipped with automatic manipulators.

Dozens of new forging-pressing machines and automated lines were created in the first year of the current five-year plan. The Voronezh Heavy-Duty Mechanical Presses Plant has manufactured a double-action hot-stamping crankshaft press with means of mechanization for stamping in detachable dies; it is intended for stamping parts without seams. Its use will permit a 1.5- to two-fold reduction in tolerances, a 40- to 50-percent reduction in machining labor intensiveness and an annual savings of 250,000 rubles.

The Stryyskoye production association for producing forging-pressing equipment has mastered the industrial production of an automated numerical preset-control complex for cutting 4x1500 mm sheet. Introduction of the complex will provide an opportunity to eliminate difficult manual labor in this operation, a metal savings of up to 10 percent due to less scrap, and an annual economic impact of 55,000 rubles.

Some 770 forging-pressing machines with preset control were manufactured in 1981, including 265 with numerical preset control, and 75 automated-line sets were produced. We produced 1,700 heavy-duty and multipurpose forging-pressing machines.

In the 11th Five-Year Plan, substantial qualitative changes are anticipated in the forging-pressing equipment production structure (Table 1).

Table 1 (in percent)

	of total produc- tion volume		1985 production in percent of 1980
	1980	1985	
automated equipment, in million rubles	8.7	10.5	143.4
heavy-duty and multipurpose machinery, in million rubles	23.1	30.2	190.0
machines with numerical preset control, in units	0.6	1.3	250.0

The production of automated and semiautomatic lines will have increased 77 percent in 1985 as compared with 1980; during the five-year period as a whole, upwards of 400 sets of such lines will be created. Providing multipurpose forging-pressing equipment with various means of automation is an important element in raising its technical level. Means of automation production volume is to grow 2.2-fold during the five-year period.

The release of equipment for high-precision cold die forging will increase 1.7-fold. The production of presses for cold extrusion will be expanded, as will that of embossing and multistation automatic presses, whose use will provide a metal savings of up to 30-40 percent.

In order to increase the scope of application of the most effective metal-saving technological process in machinebuilding, we anticipate the creation of cold-extrusion

2,500 ton-force presses at "Pressmash" production association imeni 60th anniversary of October in Odessa, of 6,300 ton-force stamping presses at the Voronezh Heavy Mechanical Presses Plant. During the five-year period, upwards of 10,000 presses will be manufactured for die forging. Highly productive new machines are being created and mastered for hot and die forging. Series production of automated forging complexes consisting for 1,250 ton-force manipulator presses and a 3,150 ton-force complex with NPC [numerical preset control] and a manipulator is being set up at the heavy press production association in Dnepropetrovsk.

The Barnaul Mechanical Press Plant and the Voronezh Heavy Mechanical Press Plant for Sheet Stamping plan to increase 2.5-fold their production of a new generation of sheet-stamping multistation automatic presses with devices to remove stampings faster and to develop broad products-list automatic sheet stamping lines. The Tagan-Rog plant and the Voronezh production association to produce forging-pressing equipment imeni M. I. Kalinin are setting up the manufacture of high-speed, high-precision automatic presses.

The accelerated development of powder metallurgy will require an increase in the production of forging-pressing equipment for working metal powder of more than two-fold. The Chimkent production association to produce forging-pressing equipment will be the first in the USSR to create such unique types of machines as 250-630 ton-force automatic mechanical presses to stamp metal powder and finish items to final dimensions; the Dnepropetrovsk production to produce heavy-duty presses will for the first time be producing 2,000 ton-force hydraulic presses, and so on. Among the items whose production is to be mastered are a 12,500 ton-force crankshaft hot-stamping press for the ZIL production association, a 630 ton-force double-crankshaft sheet-stamping press for the Belorussian Automotive Plant, a 6,300 ton-force automatic sheet-stamping multistation press for the Kama Automotive Plant, a 6,300 ton-force crankshaft stamping press and a 2,500 ton-force multistation hot-stamping automatic press for the ZIL.

Considerable work is being done on programs involving the most important scientific and technical problems. Automated equipment complexes using automatic manipulators will be developed. The equipment being mastered will enable us to increase labor productivity three-fold and lower metal use by 10-20 percent.

We propose the creation of an automated line for stamping crankshafts and front axle shafts for trucks for the ZIL production association. As this line is put into operation, labor productivity will increase 1.5-fold and metal expenditure will drop 15-20 percent. Design organizations are working on the development of highly efficient new automated units and complexes which will make extensive use of low-waste technological processes.

The introduction and efficient use of all the forging-pressing equipment being produced in the 11th Five-Year Plan, permitting the extensive use of low-waste and waste-free technological processes, will ensure a savings of approximately two million tons of metal and the hypothetical freeing of 280,000 workers as a result of improved machinery productivity and less subsequent machining.

Foundry production is an important, labor-intensive part of machinebuilding and metalworking. Casting production volume exceeded 25 million tons in 1980, including 18 million tons of cast iron.

The mechanization and automation of foundry production and the introduction of processes to produce high-precision thin-wall castings with clean cast surfaces which are maximum approximations of finished parts determine the rates of labor productivity growth for a significant number of those people working in machinebuilding.

The basic trends in the development of foundry production and foundry machinebuilding are the creation and increasingly extensive introduction of sets of equipment, automated complete systems with centralized control and electronics, and the increasing use of the latest achievements of chemistry to develop progressive new technological processes.

The complexes of foundry equipment developed in the 10th Five-Year Plan enabled us to equip large new and renovated blank production facilities in machinebuilding. Among them are the comprehensively mechanized aluminum casting shop capable of producing 22,000 tons of castings a year at Altay Motor Plant, a shop for producing high-precision steel castings using meltable forms (7,000 castings per year) at KamAZ, and others.

The scientific research and planning-design work being done in the 11th Five-Year Plan to create foundry equipment and the planned structure for producing it ensure the continued extensive introduction of progressive technological processes and change in the structure of the castings being produced. The production of specially-produced precision castings and castings using meltable forms, casting in forms with quick-hardening mixtures, casting in forms packed under high pressure and casting in forms with cores made of liquid self-hardening mixtures will be increased. The production of casting by machine, flow-line casting and conveyor casting is being expanded.

The specialized enterprises of foundry machinebuilding are faced this five-year plan with increasing equipment production by 41.5 percent in order to continue retooling foundry production. The structure of this increase anticipates:

- outstripping production of foundry automatic and semiautomatic machines and an increase in their proportion of machine production from 53.6 percent in 1980 to 75 percent in 1985. Production will be 24,000 units during 1981-1985;

- mastering highly productive automated foundry equipment complexes enabling us to equip and create automated foundry production with programmed, regulated technological processes. Their production will be increased more than 1.4-fold;

- setting up the series production of automatic machines with preset control, machines for pressure-casting with programmed press speed control and graduated pressure, molding sand slingers, microcomputer-based NPC core-casters, and others.

In accordance with the work program for solving scientific-technical problems, we are developing fundamentally new foundry machines, automated lines and complexes which ensure a reduction in output metals-intensiveness, lower metal expenditures, the elimination of hard manual labor and higher labor productivity. In particular, we are developing and mastering the production of automated multipurpose molding and core lines, including ones with preset control. They will help increase labor productivity 1.5- to two-fold and eliminate manual labor.

We anticipate releasing for experimental commercial operation a multipurpose automatic line for molding, pouring and knocking out castings which uses a combined method of packing the molds, controls the technological parameters following a program for automatic replacement of tools during the operating cycle, has inside flask dimensions of 800x700x300/300 mm and handles 120 molds per hour. The line is intended for retooling existing series-production foundry shops.

In accordance with the program, we anticipate developing and mastering the production of automated remote-control installations for pouring molds on conveyors, and also automated and flow lines which ensure the elimination of hard manual labor and a savings of metal.

"Stankolit" cast iron plant in Moscow is finishing the installation of and releasing for industrial set-up a cupola iron-smelting complex which can handle 30 tons of molten metal per hour with multiple-week (two- to three-week) smelting. All the technological operations -- charging, smelting and its monitoring, heating and feeding in air, and others -- are fully automated. As a result, we will obtain high-quality metal when using (fully or partially) scrap and production waste in the charge instead of pig iron. The cupola complex, the only one of its kind in our country, ensures complete treatment and utilization of exhaust gases, better working conditions and the freeing of manpower for other work.

In recent years, machine-tool manufacturing has increased its production of progressive machine-tool equipment, but it does not meet the new tasks of developing machine-building production. We are faced with large-scale restructuring of a majority of the machine-tool manufacturing enterprises of the ministry for the purpose of decreasing the manufacture of multipurpose machine tools and simultaneously increasing the release of special and unitized machine tools, automated and semiautomatic lines, and machine tools with numerical preset control or automatic manipulators. The process of perfecting the machine-tool production structure is reflected in Table 2.

Table 2 (in percent)

	in total production volume		1985 production in percent of 1980
	1980	1985	
special, specialized and unitized machine tools:			
units	19.1	25.3	119.0
million rubles	40.6	42.4	149.4
machine tools with numerical preset control:			
units	3.3	10.3	280.0
million rubles	19.2	26.8	200.0
including:			
multistation machines using magazines to automatically replace tools:			
units	0.3	1.0	290.0
million rubles	3.4	7.6	320.0
automated and semiautomatic machine tools in all technological groups:			
units	24.2	47.4	196.0
million rubles	39.7	56.2	200.0

Domestic and world machine-tool manufacturing experience convincingly confirms the progressiveness of developing machine-tool equipment with numerical preset control. Particular attention is therefore being paid to the expanded production of multistation NPC machine tools with magazines for automatic tool replacement. During the five-year period, upwards of 5,000 such machine tools will be manufactured.



The data in Table 3 testify to the dynamics of NPC machine-tool production development nationwide.

Table 3

	1970	1975	1980
NPC machine-tool production volume, in units	1,588	5,545	8,865
proportion of total machine-tool production, in %	0.8	2.4	4.1

We anticipate mastering upwards of 160 type-sizes of new machine-tool models in the branch, including 55 multistation units with automatic tool replacement.

Successful work is being done on developing multistation machine tools at the Odessa Precision Machine-Tool Plant imeni 25th CPSU Congress, the Vitebskiy Machine-Tool Plant imeni S. M. Kirov and others. The mastered gamut of multipurpose drilling-milling-boring high-precision machine tools built on the unitized-modular principle and using extensive subassembly and parts standardization permits organizing their cooperative manufacture. The technical resolutions embodied in the machine tools ensure 2.2- to 2.5-fold higher productivity than in those released previously.

The Ivanovskiy Machine-Tool Manufacturing production association imeni 50th Anniversary of the USSR has mastered the release of the IR-500, IR-800 and IR-1600 multipurpose machine tools and machine-tool modules based on them which permit their use in automatic sectors and lines controlled by a central computer. Along with the machine tool itself, the module includes a device for automatically loading and unloading the parts and replacing the tools, as well as conveyor receiving and transfer mechanisms.

"Machine-Tool Manufacturing Plant imeni Sergo Ordzhonikidze" production association in Moscow has released a reference series of a special readjustable 52-spindle machine tool with cyclical preset control and multiple-spindle replacement boxes. The spindle boxes are replaced and the machining routine and operating cycles changed automatically by a program determined by the technological processes. The machine tool will replace 15 multipurpose machines and free 28 people for other work.

The experience of these associations is being used to develop designs and set up the production of a new generation of multistation machine tools at other enterprises as well.

Multistation machine tools are being developed to work heavy parts. The Minsk Machine-Tool Manufacturing production association imeni October Revolution has set up the release of multistation plano-milling machines. The Ul'yanovskiy Heavy and Multipurpose Machine Tool Plant has developed a 2,000-mm bed plano-milling machine. The Novosibirsk "Tyazhstankogidropress" production association and the Leningrad Machine-Tool Production Association imeni Ya. M. Sverdlov are developing a boring machine with a 320-mm spindle.

During the 11th Five-Year Plan, we intend to produce upwards of 100 multistation NPC heavy-duty and multipurpose machine tools. The release of NPC machine tools at existing enterprises will be considerably expanded. Moreover, we are faced with switching over entirely to the development and production of machine tools with NPC devices on a BIS [LSI: large-scale integration] base using microprocessors and high-torque electric-drive motors in the years immediately ahead.

Thus, "Krasnyy proletariy [Red Proletariat]" plant in Moscow is setting up the large-series production of NPC machine tools and is decreasing its production of ordinary multipurpose machine tools. A similar restructuring is also underway on differing scales at a number of other machine-tool manufacturing enterprises. Enterprise re-specialization requires the creation of new subdivisions in the technical services and the extensive involvement of electronics and computer specialists, programmers and mathematicians. Shaping the new personnel staff is one of the decisive conditions for continued development of metalworking equipment using numerical preset control. The appearance of compact electronic control systems built using modular units demands that machine-tool designers master new methods of design. We are faced with eliminating the lag in developing grinding, honing and superfinishing machine tools with numerical preset control.

One effective way in which NPC machine tools can be used is to organize comprehensively automated sectors of such machines and use central computer control. The experience accumulated in this area enables us to create sectors with improved equipment layouts and better automatic control devices.

Developing branches of machinebuilding with large-scale and large-series production, continued specialization and the development of centralized general machinebuilding production are determined by the heightened demand for automated and semiautomatic lines, special and unitized machine tools. The fleet of machinebuilding and metalworking equipment is systematically being reinforced by automated and semiautomatic lines. Thus, their numbers increased by more than 4,000 sets during 1976-1980.

Increasing the release of automated machine-tool lines and special and unitized machine tools is a most important branch task. Along with specialized enterprises producing lines to manufacture individual subassemblies and units, we are in addition involving several machine-tool plants as well. The highest amount of capital investment in machine-tool manufacture is being allocated to develop production capacities to produce lines and unitized machine-tools.

Design organizations and enterprises have accumulated valuable experience in developing automated lines and line-complexes for the VAZ [probably Volga Motor Vehicle Plant], and especially for the KamAZ [Kama Motor Vehicle Plant]. Automated lines to work body parts being supplied the Volga Motor Vehicle Plant, Zavolzhskiy Motor Plant imeni 50th Anniversary of the USSR, Kama Motor Vehicle Plant and several other customers correspond in terms of scope of technological operations, machining precision parameters and productivity to the imported lines operating alongside them in these plants. The reproduction of lines at the exact same high technical level for all branches of machinebuilding must become the primary task in the area of developing and producing automated lines in the current five-year plan.

In 1981, the branch manufactured 230 sets of complete automated and semiautomatic lines. The complex of 14 automated lines produced by "Machine-Tool Manufacturing Plant imeni Sergo Ordzhonikidze" production association for the KamAZ frees 700 workers for other jobs and provides an overall economic impact of about two million rubles.

Design organizations and enterprises are faced with resolving the tasks of setting up the production of comprehensively automated line items readjusted to various sizes and creating equipment to automate the mass-assembly of machinebuilding items. The Ministry of Machine Tool and Tool-Building Industry will supply sets of equipment to completely machine parts. But even such complete sets require a considerable amount

of nonstandardized equipment which is not a machine tool manufacturing specialty. The necessity has therefore arisen for the USSR Gosplan to decide to assign to definite ministries the manufacture of nonstandardized assembly-component equipment.

The creation of standardized technological and transport equipment for automated lines is significantly complicated by the inadequacy of customer work on standardizing the design of mass-produced parts and the technological processes of manufacturing them. This leads to expansion of the products list of equipment and to the creation of a large number of unique automated lines for each customer, and it increases the labor-intensiveness and schedules for performing work and the cost of the lines. It is very urgent that this problem be taken up, under the overall leadership of the USSR Gosstandart [State Committee for Standards], foremost by the design and technological planning organizations of automotive industry, tractor and agricultural machinebuilding. Organizations of the Ministry of Machine Tool and Tool-Building Industry will also be participating actively in this work.

In connection with the intensive development of nuclear power engineering, transport machinebuilding, petroleum and gas industry and other branches of heavy industry, the demand for heavy and unique machine tools will grow in the years ahead. During this past five-year plan, dozens of unique, specialized machine tools were created, and the production of heavy and unique machine tools will be increased 19-20 percent in the 11th. We anticipate the start-up of additional capacities to produce such equipment. Heavy and unique machine-tool standardization will be enriched by new multipurpose and specialized models which will meet the technical demands of heavy machinebuilding. Modern electronic control systems permit the creation of unique multistation machine tools and complexes with fully automated machining of large, complexly-shaped parts without readjustment.

According to data from the Experimental Scientific Research Institute of Machine Tools, the national economic impact of introducing the amount of machine-tool equipment planned for the 11th Five-Year Plan in the anticipated structure will be expressed in the hypothetical freeing of 1,356,000 workers and the savings of about 750,000 tons of metal. Supplementing the machine-tool equipment fleet will ensure an increment in output in the national economy of approximately 59 billion rubles.

A significant place is given to the development and improvement of automated, preset-control manipulators in the plans of design organizations and individual plants. At present, upwards of 30 manipulator models have been developed for machine tools and machinery. In the current five-year plan, we anticipate manufacturing upwards of 9,000 automatic manipulators. They are to be supplied primarily as parts of sets of corresponding types of equipment and automated lines. A new generation of manipulators is being created which will be distinguished by high indicators in terms of universality of application, speed of operation, reliability, weight and dimensions, and other parameters. Work is being done along this line under a corresponding comprehensive program approved by the GKNT [State Committee for Science and Technology].

The increased production of modern machine-tool equipment is being accompanied by the development of highly productive tools, foremost by expanding the production of tools using diamonds, el'bor [a borazon material] and other superhard materials. The series production of cutting and auxiliary tools for NPC machine tools has been organized.

As compared with 1980, the 1985 production of metalworking tools is to be 29.7 percent higher. The manufacture of tools equipped with multifaceted blades, as well as of

ones made of tungsten-free alloys and mineral ceramics, will grow significantly. We will manufacture nearly two-fold more blade-type tools made of polycrystalline diamonds and other superhard materials. Work continues on utilizing new brands of superhard materials. A rather strong base has been created for providing machinebuilding with diamond tools. Their production will be expanded approximately 1.3-fold during the five-year plan.

The scientific research institutes, design and technological planning organizations of the ministry are making a significant contribution to raising the technical level of the output, creating scientific-technical stockpiles and resolving the tasks of improving production efficiency. At the same time, certain types of machine tools and machines are inferior to the best foreign models in terms of level and reliability of automatic control devices, retention of precision parameters during operation and degree of technological instrumentation. L. I. Brezhnev's criticism of the activity of scientific research and planning institutes at the November (1981) CPSU Central Committee Plenum is fully applicable to the scientific research institutes and design bureaus of the Ministry of Machine Tool and Tool-Building Industry.

The lead branch institutes are now regrouping their scientific and engineering forces to develop the new lines of technical progress. It is necessary to assign to the scientific research institutes certain new functions and duties which influence the process of developing and utilizing progressive equipment. With the concurrence of the Gosstandart, the ministry has developed branch standards which anticipate simplifying the procedure for working out and agreeing on technical documentation and procedures for testing prototypes. However, there is still much formalism in this area. All design organizations are resolutely demanding that the situation which has evolved be changed.

The branch target programs, which set a unified technical policy for all branch organizations and enterprises, as well as steps to achieve high technical parameters, play a substantial role in raising output technical level and quality. In particular, programs have been worked out for improving the reliability of machine tools and automated machining lines, for ensuring the productivity and precision of machine tools, for increasing the precision of blanks obtained on forging-pressing equipment, and for ensuring the reliability and durability of forging-pressing equipment. Programs have been created for developing and increasing the efficiency of foundry, forging-stamping and welding production. The implementation of work programs for the most important scientific-technical problems approved by the GKNT for the 11th Five-Year Plan will be of great importance. It is anticipated that 163 fundamentally new types of equipment will be created and the production of 107 models of reference industrial series will be mastered as a result of the implementation of these programs.

In order to ensure planned up-dating of output and creation of scientific-technical stockpiles, the scientific research institutes, special design bureaus and enterprises are faced with creating upwards of 2,000 prototypes of technological equipment, mastering 1,590 reference series and withdrawing 500 models of obsolete design during the five-year plan. Mastering and expanding the production of new equipment and implementing measures planned to improve product quality will enable us to increase the proportion of highest quality-category products to 49-50 percent of all output produced, as against 41.3 percent in 1980.

Solution of the problem of raising the technical level and competitiveness of metal-working equipment, along with steps being carried out in the branch, will require an

immediate change in the situation regarding provision of machine-tool manufacture with modern assembly components and high-quality materials. Appropriate steps are already being taken in a number of ministries -- Ministry of Electrical Equipment Industry, Ministry of Instrument Making, Automation Equipment and Control Systems, Ministry of Electronics Industry, Ministry of Defense Industry and Ministry of Radio Industry. Work in this area should be accelerated to the maximum.

We are faced with carrying out broad measures to lower the specific metals-intensive-ness of machine tools and machinery. Organizations and enterprises have for the first time been set specific assignments on reducing the weight of 320 models of the most metals-intensive series-produced output. Meeting these assignments will ensure an average weight reduction of 5.7 percent.

Developers are obligated to lower the specific metals-intensiveness of the equipment being developed as compared with analogous equipment produced previously or as compared with the best foreign analogs. Weight parameter indicators must be evaluated at all stages of technical documentation development and prototype manufacture and testing.

Along with resolving the tasks of developing highly efficient modern metalworking equipment and increasing the scope of its production, questions of organizing its efficient use are equally pressing. There have been instances of failure to coordinate schedules for building facilities and renovating enterprises with equipment delivery schedules being planned. Thus, many client ministries, while insistently demanding shorter schedules for delivering automated lines, have not displayed concern for preparing conditions for introducing them. According to 1 February 1981 data, consumers had failed to put into operation two-fold more lines than were being produced annually by branch plants. Unique equipment and machine tools with numerical preset control have sometimes been used unsatisfactorily.

The implementation of large-scale measures to use raw material and fuel-energy resources more economically and efficiently is being given an important place in the complex of work being done to increase production efficiency in machine-tool and tool-building industry. In the 11th Five-Year Plan, the Ministry of Machine Tool and Tool-Building Industry is faced with lowering rolled ferrous metals expenditure norms by 21 percent and raising their use coefficient to 0.67.

The CPSU Central Committee and USSR Council of Ministers Decree "On Intensifying Work on Using Raw Material, Fuel-Energy and Other Material Resources More Economically and Efficiently" (of 30 June 1981) obligates the branch to make a decisive turn-around in all its planning, economic activity, science and engineering towards the more efficient and economical use of resources. With a view towards implementing a systematic, comprehensive approach towards actualizing the indicated decree, the ministry has worked out and approved a "Target Branch Comprehensive Program for Improving the Efficiency of Material and Fuel-Energy Resources Use." The program is a system of engineering and organizational measures which anticipate, in particular, steps to introduce low-waste technology and increase the effectiveness of material-technical resources use. They determine the subject matter of scientific research, planning and exploratory work to lower the metals-intensiveness of the output being produced, and of tools in particular, and they set assignments on lowering the weight parameters of specific models of machine tools and machinery and on developing new and reworking existing branch materials on setting material resources expenditure rates.

Reducing metal scrap and losses and raising the metal use coefficient depend on the structure of the blanks being used and the progressiveness of the technology of their manufacture. The target comprehensive program anticipates considerable work on raising the technical level of blank production and on introducing low-waste technology. During the five-year period, it is proposed that uneconomical types of cast output be replaced by approximately 100,000 tons of welded metal components, which will enable us to save 42,000 tons of cast output. Assignments have been set on expanding the use of economical types and shapes of metal products, including: bent shapes -- 1.5-fold, hot-rolled shapes for branch use -- two-fold, high-precision steel section-shapes -- 1.7-fold, and so on. Meeting them will lead to a savings of upwards of 40,000 tons of rolled ferrous metals.

Some 260,000 to 265,000 tons of cast parts will be manufactured using progressive methods of producing castings, which will save 27,000 tons of metal. The level of use of parts made from plastics will have increased more than two-fold in 1985 as compared with 1980 and will be 7,400 tons, although this is entirely inadequate.

For the first time, target-program measures have been worked out for saving lumber by expanding the use of economical types of packing and transport for finished products -- bulk automobile shipments and the use of reusable packing, partial and lightweight packing, wood-fiber sheet for lining packing crates, and so forth. As a result, 240,000 m<sup>3</sup> of lumber will be saved. We have outlined a complex of measures to save coke and electric power.

However, the important condition for carrying out assignments and measures on saving metal products is the implementation of a number of urgent measures by supplier ministries and USSR Gosstab organizations. Thus, the USSR Ministry of Ferrous Metallurgy must fully meet the demand in our branch for needed brands of cast and reversion iron and ferroalloys. It must decrease installation order lots of economical types of rolled metal by a minimum of two-fold, ensure the delivery of 50-160 mm thick very level and super-level sheet and accelerate the utilization of economical types of sections being ordered by its enterprises.

The USSR Gosstab must lower its transit delivery norms two- to three-fold, expand its assortment of rolled sheet at territorial administration metal centers and create at the metal centers sectors for the centralized cutting of graded and sheet rolled metal.

Resolution of the tasks of raising the technical level and improving the quality of products, as well as increasing branch production efficiency, labor productivity and material resources economy, depends directly on the technical level and production standards of machine-tool and tool-building industry itself. This branch is faced with ensuring the entire increment in output at existing plants without an increase in the number of workers. It is also important to provide production with machine tool operators, reduce the numbers employed at manual labor, and expand brigade forms of labor organization.

Attention is being turned towards improving the machine-tool equipment fleet. We intend to raise the proportion of machine tools with numerical preset control to 10 percent. Some 88 complete automated and semiautomatic lines, 22 automated sectors consisting of machine tools with numerical preset control and upwards of 7,000 highly productive machine tools will be introduced.

A "Target Comprehensive Program for Reducing the Use of Manual Labor By Workers in Basic and Auxiliary Jobs With Difficult Working Conditions" has been created to actualize the tasks of heightening labor productivity.

Implementation of the indicated and other steps to perfect the technical level of production will permit the hypothetical freeing of 58,000 to 60,000 people in the branch for other work and a 12-percent rise in labor productivity.

We are faced in the 11th Five-Year Plan with much work in the area of capital construction. One characteristic feature of the capital construction plan is the significant increase in funds being allocated for retooling enterprises, which will be used to provide about 60 percent of the increment in machine-tool production capacities. Some 43 percent of all capital investment is being directed into renovating and expanding existing branch enterprises, 37 percent will be used for retooling and 15 percent -- to finish the construction of new enterprises. We have outlined a broad program of continued improvement in the sociocultural, housing and personal-services conditions of branch workers.

Machine-tool builders and tool-manufacturing workers have always been on the leading frontiers of technical progress. The branch has widely developed socialist competition to meet and overfulfill plan assignments, for a worthy greeting to the 60th anniversary of the formation of the USSR. The socialist obligations assumed in the branch anticipate completing the 1982 plan and the five-year plan as a whole ahead of schedule, obtaining at least one million rubles in above-plan profit, ensuring an increase in production at existing enterprises without increasing the numbers of workers, meeting by 25 December assignments on developing and introducing new equipment, and a number of other obligations which will help to improve the efficiency of branch operation.

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## METALWORKING EQUIPMENT

### ROBOTICS: APPLICATIONS, DEVELOPMENTS

#### New Industrial Systems Exhibited, Described

Moscow NEDELYA in Russian No 38, Sep 81 p 4

[Article by S. Shevchenko: "A Steel Family of Robots"]

[Text] "...Develop production and undertake the extensive introduction of automatic manipulators (industrial robots) and built-in automatic control systems incorporating microprocessors and microcomputers, build automated shops and plants...."

#### from Basic Directions

Models of our domestically fabricated robots and robotized systems have been assembled in the Machine Building pavilion at the USSR All-Union Exhibition of National Economic Achievements. One of the "hits" at the exhibition has been the rapidly readjustable automatic line with numerical program control manufactured by Moscow's Machine-Building Plant imeni Sergo Ordzhonikidze production association. This machine makes everything surprisingly easy. The operator inserts an ordinary magnetic tape cassette into the numerical program control unit; the device itself locates the required program on it; the operator removes the cassette, presses the "Start" button and the line then begins to function on its own. The two mechanical arms, the most powerful we have in this country, function dexterously: they each can lift as much as 160 kilograms. They will grasp a shaft with precision, position it on the lathe, which then works it itself, and then wait their few seconds--to remove the finished pieces. All the robot's movements are accurate to within 0.1 centimeter. There are two lathes on the line; but if the gantry along which the arms move is extended, more can be added. The trajectory of the motion of a steel arm can be varied from a control console. One of these lines has already been put into operation at a Kran association plant in Tul'skaya Oblast (Uzlovaya station), while assimilation of the line is beginning in six other cities.

A production section with a three-armed robot is stamping pieces on two presses at the same time. A conveyor like this will make its appearance this year in Moscow's Rubin production association and at the Elektrosignal works in Voronezh. The Voronezh Experimental Scientific Research Institute of Forging and Stamping Machine Building has developed and is fabricating a three-armed manipulator. It will go into series production in 1982.



A separate room in the pavilion is devoted to a product of the special industrial cybernetic design bureau located at the Leningrad Polytechnical Institute imeni M. I. Kalinin. Here is technology of the future. From among many pieces, for example, this robot is capable of selecting the one desired. Imagine a control console a big as an average-size television set, on supports in front of it an arm with a five-digit hand, the fingers (gripping devices) sensitized and detachable. The operator gives a command into a microphone: "Program two. Start." The hand then "comes alive" and begins to search for the desired object, in this instance, according to program No 2, an electric light bulb. As the hand carefully picks up and screws in the bulb, the movements of its fingers remind one very much of human movements. On a television screen on the control console the operator can follow all manipulations and, if necessary, make corrections. All this is referred to as an integrated adaptive manipulator incorporating a console with a television system of supervisory control.

How will our robotics develop in the future? Igor' Mikhaylovich Makarov, corresponding member of the USSR Academy of Sciences and chairman of the USSR Academy of Sciences' council on the "Robots and Robotic Systems" problem, talked about this:

"In the Tenth Five-Year Plan period," he says, "we built 7000 robots and manipulators of different types; during the current five-year-plan period we plan to make 40-50,000. Now engaged in this effort are some 100 organizations, 34 ministries and departments, the USSR Academy of Sciences, 12 scientific research institutes and some 50 VUZs. As economic benefits we expect to be able to increase labor productivity 1.5-2-fold and free 100-120,000 persons for employment elsewhere.

"We anticipate the process of introducing robots to take two courses. First, via rebuilding and converting existing equipment to work with robotic systems and second, the development of entirely new integrated automated production facilities. This will bring us closer to accomplishing the social and economic tasks involved in improving the quality, technology and standards of production, improving labor skills etc., while at the same time we will be gaining from being able to eliminate irregularities, to smooth out the rhythm of the production process overall: for the fact is that these iron helpers are capable of working three shifts "without a break" and, as they say, you don't have to feed'em and they don't often break down.

#### Industrial Robot Builders

Moscow KRASNAYA ZVEZDA in Russian 27 Sep 81 p 4

[Article by Lieutenant Colonel Yu. Romanov, KRASNAYA ZVEZDA correspondent: "Creators of Industrial Robots, Today is Machine Builder's Day"]

[Text] Machine Builder's Day is a holiday for those who build today's high-capacity, highly productive machinery and equipment for the national economy. The USSR has built up a large, multibranch machine-building industry. It is second in the world in total production volume and first in the output of many types of machinery and equipment.

We are now devoting a great deal of attention to an effort to increase our production and expand introduction of automatic manipulators (industrial robots) to mechanize and automate production within our national economy. In our report from one of our leading production

associations, the Machine-Building Plant imeni Sergo Odzhonikidze, we tell about people who build industrial robots.

"Here's our new assembly shop," association chief engineer O. Albul told me.

The dimensions of the shop were cyclopean. I had never seen anything like it before in my life. After passing groups of exotic machines and units separated from one another by areas of open floor, we at last arrived at our destination.

...Under way here is a test of an automatic machine line with numerical program control incorporating robots with numerical program control. We don't have another one in the country like it.

A young trouble-shooter, S. Filyutkin, lifted a heavy billet about two meters long with a crane and positioned it in its initial position. Then he began to operate a keyboard...whereupon the machine, obeying him, processed the piece. A highly complex piece was now finished.

"Now watch," the chief engineer said to me with a nod.

One of the mechanical "arms" I had't noticed until then on the robot, now alive again, then picked the heavy billet up lightly and with a precise motion positioned it properly on a transporter. I could hardly believe my eyes: obeying the robot, the automatic line now repeated all the operations Filyutkin had shown it. The machine can be "taught" to process other pieces in exactly the same way....

"And notice," Albul added with some satisfaction, "the analyzer robot has already taken superfluous and incorrect motions out of the program and optimized nonoptimum motions. The system functions with either active or adaptive control: worn down cutting tools 'grow,' there thus being no loss in the desired precision with which a piece is worked. The line can thus run an entire shift and even longer without stopping. We see this to offer the possibility of going over to a 'nonhuman' technology in series production...."

"Smart" industrial robots free the human worker from heavy, monotonous labor. They increase his productivity sharply. They can function under conditions of relative inaccessibility as well as under conditions which pose a relative danger for human beings, in the nuclear industry for example.

But the creation of these machines and lines requires highly skilled specialists. Many young machine-tool plant workers are studying in schools for young workers, in evening and correspondence technicums and institutes. Preparatory courses which the plant has organized for VUZ entrants have also been of benefit; a branch of the All-Union Correspondence Polytechnical Institute has been opened here as well. Everything is done to enhance worker skill and understanding and encourage initiative and rationalization.

We are now speaking with A. Shumilkin, secretary of the assembly shop party bureau.

"We are finishers here in this shop," he explains. "We provide the intelligence for unique new industrial robots and do everything we can in the way of rationalization. Hero of Socialist Labor V. Komarov's brigade was recently assigned the task of assembling two robots to service one of our newest automatic lines. They accomplished their

task quickly, but the machine tools had not arrived. Assembly personnel then suggested that we test the robots with the program but without the machines. As a result, we saved a lot of time, and, what with the conditions we work under, when each line is costing hundreds of millions of rubles, this is a big saving."

It is no coincidence that the designers here know all the assembly personnel by first name and patronymic and that the latter know them equally well.

P. Levashov, a former front-line tanker, is the plant's chief designer.

"I have to travel abroad on business," he points out. "You're unconsciously making comparisons. Take our recent trip. In a meeting with the chief of our design bureau, V. Kryuchkov, Mr. Goeren, president of the Gildemeister firm (together with this firm we have developed semiautomatic front-loading two-spindle machines with numerical program control), evaluated the quality of our designers' work very highly."

The plant has many outstanding people. There's Vasiliy Nikolayevich Ledovskikh, leader of a polishing brigade. He is a war veteran, a deputy to the Moscow soviet, a USSR State Prize winner and holder of the Order of the Red Banner of Labor and the Badge of Honor. His brigade met its targets for the last five-year-plan period by V. I. Lenin's 110th birthday anniversary and has now undertaken to fulfill this year's plan by our October celebration. Among his best students, this teacher names reservists Vladimir Kiselev, Konstantin Polepin and others.

Around the plant you hear spoken with love and respect the name "Master-golden hands;" this is Yevgeniy Panteleymonovich Kop'yev, a lathe operator, a teacher of the young, winner of the USSR State Prize and holder of the Order of Labor Glory, 2d and 3d degrees. Kop'yev was a delegate to the 26th Party Congress and one of the initiators of the movement "Meet targets for the first year of the Eleventh Five-Year Plan by the 64th Anniversary of the Great October!" Twelve brigades have responded to this call.

Machines and automatic lines built by Ordzhonikidze plant workers are now in operation in the AvtoZIL association, in tractor plants in Khar'kov, Chelyabinsk and Volgograd and many other places. Sixty-two units of custom-designed automatic lines were delivered last year to KamAZ [Kama Automobile Plant] alone.

Equipment from leading Western firms was installed in the first phase of construction of the KamAZ and VAZ [Volga Automobile Plant]. But then the U.S. administration refused us delivery of this equipment. Our domestic machine-tool industry had then to launch a crash program to develop its own equipment. This is now in operation and in no way inferior to equipment of foreign manufacture.

Overall, the association's machines made it possible for our national economy to free up some 32,000 workers over the course of the Tenth Five-Year Plan and proved of great economic advantage. Machine-tool plant workers are continuing to work at the same intensive pace into the current five-year-plan period as well.

Speaking of machine-tool plant workers, we cannot fail to single out among them the name of Nikolay Chikirev. You hear about him throughout the plant at every turn; he is associated with some of the most impressive accomplishments these workers have to their credit.

KRASNAYA ZVEZDA and Nikolay Chikirev have been friends for a long time. Ever since, in fact, the time after the war when the paper published a short letter from this remarkable lather operator from Sergo Ordzhonikidze. He had been 14 years old when his father and older brother had gone to the front. Nikolay immediately signed on at the Ordzhonikidze plant to help support the front. He was soon meeting his quota requirements to the tune of almost 3000 per cent. He was invited to a meeting of outstanding workers at the Kremlin.... He recalled his correspondence with a soldier fighting at Stalingrad who had worked at with him on the same machine before he left for the front and how hard he had studied.... Then on the eve of the 1958 May Day celebration, a KRASNAYA ZVEZDA correspondent visited Chikirev in his apartment, the latter now a shop supervisor, a USSR State Prize winner, a delegate to the 12th and 13th Komsomol Congresses....

It was now about many things that we, too, talked with Nikolay Sergeyevich Chukirev, currently general director of the Stankostroitel'nyy zavod [Machine-Tool Plant] production association.

"We have before us," Chikirev emphasized at the end of our conversation, "the task of turning out equipment whose operation will yield the greatest economies in manpower and material resources. 'The economy has to be economical'--these words of Comrade L. I. Brezhnev have become the slogan for a movement encompassing all components of the plant's administration and production operations at all levels--from worker to manager. Our machine-tool plant workers will discharge this task with honor.

#### Enhancing Effectiveness of Robotization

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Sep 81 p 2

[Article by V. Gavrilov, chief engineer, Soyuzelektrotekhnologiya All-Union Industrial Association, Ministry of the Electrical Equipment Industry and manager of the branch full robotization program: "Robots and the Economy"]

[Text] Here's an incident that occurred in our primary technological institute, VPTI-elektro [All-Union Institute for the Planning and Design of Electrical-Equipment Production Technology]. Within the institute there is a department responsible for coordinating scientific research, design and testing operations, which is headed by Mikhail Gerasimovich Grebennik, a very capable economist respected by all. It must be said that in everything having to do with economics we branch employees have more confidence in him than we do in ourselves. All supply authorizations and technical-economic validations must always undergo a rigorous verification process in this department. If a proposal is not effective, it will not even reach the ministry. Grebennik will not allow it.

Across Mikhail Gerasimovich's desk on this particular occasion had come an order for the development of some robotics units. As always, he familiarized himself with the accompanying documentation as thoroughly as possible; he read everything and then declared:

"No, this won't do.... If we start to work like this, we'll ruin not only the institute, but the whole country as well."

Neither the director of the institute nor senior officials of the all-Union production association were able to persuade him otherwise. This had been the only instance in which they had come upon a supply order without M. G. Gerasimov's signature.

The industrial robots involved here would have paid for themselves only after 10 years or longer. All this being the case, was the specialist correct? We do know something else, however: without extensive and universal introduction of automatic manipulators it will be impossible today to accomplish the most important tasks of further increasing labor productivity and improving working conditions. Accelerated introduction of this sophisticated equipment is also dictated by the demographic situation which has taken shape in the country. Take our branch, for example. This is now the second five-year plan in which USSR Gosplan calls for the ministry to achieve a 6-7-per cent rate of increase in annual production volumes with virtually no increase in manpower. Our enterprises, however, are not going to be able to approach even this level of manpower.

There is only one solution--we are going to have to increase labor productivity above and beyond the level planned with the objective of compensating for the shortages of manpower anticipated in the current as well as subsequent five-year plans. So the development of industrial robots together with automatic production lines has become for us a matter of the utmost urgency. And the effort is under way. Since 1973, the Ministry of the Electrical Equipment Industry has developed some 20 different models of industrial robots and manipulators. They are being employed in machining, cold stamping, pressure casting, assembly and warehousing operations.

But as it has developed, the situation, to put it bluntly, is paradoxical: on the one hand, we need to develop this advanced equipment, which our specialists well understand, and on the other you have the situation today in which this equipment is economically ineffective. What it comes down to essentially is the fact that, from an economic point of view, neither our developers nor their customers are putting robots to advantageous use.

But how are we to break out of this vicious circle? One way, in our view, is to improve the method we employ to compute the economic effectiveness of the application of industrial robots. This question is not being raised in the press for the first time here. I would like to recall, for example, the article "Don't Come Out the Loser" SOTSIALISTICHESKAYA INDUSTRIYA published on 22 January this year. The author, Yu. Vil'chinskiy, head of department, NIITavtoprom [Scientific Research Institute of Motor Vehicle Industry Technology], points out entirely correctly that in computing robot effectiveness it is wrong to take into account only the wage fund of workers freed from their positions. For it is indeed the case that a robot requires no housing, no trade union pass to the sanatorium, no place in the dining hall or kindergarten etc. The procedure currently employed does not take these expenditures into account. But if it did?

Our ministry and, as far as I know, a number of others have made the effort. Among other things, we have developed a new procedure, which is based upon the one now employed, but here, in addition to worker and engineer wages, we have also figured in all associated expenditures for social needs. With what result? On the basis of these new computations, robot effectiveness rose some 2.5-3-fold. There would be nothing for Mikhail Gerasimovich to take exception to here.

It is possible that our method is deficient in some way. All the more necessary is it then, since this question has now reached the point where it requires resolution, for us extensively and thoroughly to discuss what we as well as other ministries have accomplished. I even think it would be to advantage as an experiment to introduce robots on the basis of the new method in enterprises, let's say, of the electrical equipment industry. We could then see the advantages and drawbacks to this method in the light of a specific, real-world situation. The matter is now in the hands of the GKNT [USSR Council of Ministers' State Committee on Science and Technology] and USSR Gosplan.

There can be no doubt that an improvement in calculations will help break down the psychological barrier surrounding and increase a general interest in accelerating their development and introduction. It is at the same time entirely clear, however, that, together with this, it will also be necessary to find other ways to increase the economic effectiveness of this advanced equipment. I want to underline the fact that our branch has now moved in the direction of the development of robotics systems.

It would surely be unnecessary to explain that nobody needs a robot all by itself. An automatic manipulator requires auxiliary devices to move a piece to the work area and to remove it from the area as well as a variety of gripping components and other equipment. You also have to do a certain amount of planning and selection in connection with the equipment the robot is going to be serving. Finally, you need a unit to control the entire aggregate of mechanisms and devices. Taken together we refer to all this as a robotics system.

Unfortunately, however, there do not, practically speaking, exist two completely identical systems. We have to design and build a different system of equipment in each specific instance depending upon the concrete production conditions involved. Hence the complexities involved for both the plants fabricating these systems and their customers. The former have to put them together "on their knee," as they say. Productivity is consequently low, while cost, on the other hand, is high. And then the customer has difficulties in running these systems because he has now to work with non-standardized components.

It is for precisely this reason that, together with the Special Industrial Cybernetics Design Bureau of Leningrad Polytechnical Institute, the primary organization for robotics, we have developed a system standardization scheme, in which for the first time in the branch an attempt has been made to standardize not only the robots themselves, but a system as a whole. I would like at this point to mention three basic principles guiding the development of this scheme. First, in constructing it we kept in mind the fact that the systems we were proposing could find application not only in electrical equipment manufacturing, but in virtually all the machine-building branches, what with the fact that the basic production processes here are similar. Second, we are anticipating the use of electromechanical drives in these systems, considering the fact that compared with hydraulic and pneumatic drives they offer a whole series of advantages. These include being more economical. The third principle, finally, and this was perhaps the most important one, was these robotics systems would be constructed in accordance with the modular principle. It would thus be possible to modify these systems using standardized components, which would reduce the cost of the robots.

Work on the development of one such system in this standardization scheme is now virtually complete; it will be displayed at the Elektro-82 international exposition. An effective solution of problems involved in increasing the economic effectiveness of

industrial robots is for us of particular importance. The Ministry of the Electrical Equipment Industry has been designated the primary ministry for welding, electrothermal and plasma-processing robots; we are also responsible for providing all branches of industry with the electric drives for robot fabrication. The Eleventh Five-Year Plan has called for sharp increases in the fabrication of automatic manipulators and auxiliary devices. Our enterprises are thus by the end of the five-year-plan period to manufacture 500 robotics systems.

We have before us as well the task of developing specialized capacities for industrial robot manufacture. And we could remark in passing that this would also be a way to increase their effectiveness. The fact is that so far it is pilot plants which are primarily engaged in the fabrication of automatic manipulators within the branch. And as we know, expenditures in this instance are always greater than in specialized enterprises.

In a word, in improving our models of these mechanical helpers and in making more of them, we must also be giving continuous attention to increasing their economic effectiveness so that the national economy will be able as quickly as possible to obtain from them its full return. Our economists will then beyond any shadow of a doubt be putting their signatures to projects to develop and introduce robotics systems.

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## METALWORKING EQUIPMENT

### PROBLEMS, DEVELOPMENTS IN MACHINE-BUILDING INDUSTRY DISCUSSED

#### Lack of Spare Parts Retards Retooling of Machinery Plant

Moscow TRUD in Russian 5 Jun 81 p 2

[Article by Yu. Borisov, chairman of the equipment repair and modernization section of the Central Board of the machine-building industry's Scientific and Technical Society: "The National Economy is Bearing the Burden of Losses Due to Shortages of Spare Parts"]

[Text] Our inventory of machines, tools and other equipment is growing larger and more complex. There is another aspect to this gratifying process, however. The more industry becomes saturated with modern machines and equipment and the greater the complexity and precision of these items, the greater the expenditures required for technical maintenance and repairs.

The repair of only two types of equipment, metalworking and wood-processing equipment, is alone now absorbing more than 3 billion rubles annually. According to forecasts by specialists, at present rates of growth these expenditures will double in 15 years.

The demand for auxiliary personnel is increasing continually. Nationwide there are now already more than 1.2 million people engaged in repairs and technical maintenance on equipment in the two categories referred to above.

We know one very effective way to reduce all types of repair expenditures, to include labor costs. We have to manufacture more reliable, more durable equipment: this will mean less time required for technical maintenance and fewer breakdowns requiring repairs.

And then, of course, we have to improve the quality of our repairs themselves. Otherwise, as specialists in the GDR (where similar problems are to be encountered) have calculated, within a few decades the requirement for personnel to perform technical maintenance on machinery and equipment will by many times exceed the number of personnel working in industry overall.

One of the maintenance man's pressing concerns is spare parts. The way things stand now, any enterprise, even a small one, has to make its own parts to replace any which have failed. This is no simple matter: in the components of today's machines are to be found parts of great complexity from both the design and engineering point of view.



The only acceptable (you wouldn't really call it rational) solution therefore becomes that of equipping repair shops with the fullest complement of machine tools possible. It should thus come as no surprise that concentrated in enterprise repair facilities are almost one-third of the country's metal-cutting machines. An entire branch of industry!

The development of this kind of "natural economy" inevitably entails amateurish, inefficient operations. It has been calculated that items manufactured on this basis require labor expenditures three to four times greater than would be the case in specialized enterprises engaged in large-scale production.

In manufacturing their spare parts, repair personnel are using rolled metal sections rather than special stamped billets--the high road to material waste and overconsumption! Then finally, the quality of these pieces is far from ideal. Can we really imagine it possible to make a piece that will last if we don't have the right brand of steel, if there is no heat treatment and if frequently there is even no knowledge of the technology involved?! This kind of repair only hastens the need for another.

It would of course be to advantage to be able to get our spare parts from the plant that manufactures the equipment. But alas, the manufacturers brush any such notion aside. And with such enthusiasm. The machine-tool manufacturing industry, for example, satisfies only 10-15 per cent of the demand for spare parts. Spare parts account for no more than 3-5 per cent of this branch's total production volume. At the same time, in the case of other industrially developed countries, in the FRG and the US for example, they account for 20 per cent and more.

That we could improve the organization of our repairs with such a paucity of suppliers is simply inconceivable. Manufacturers have no real economic interest in increasing their production of spare parts.

Simple common sense would suggest that, what with all the problems we have, it would be to incomparably greater advantage to expand production of parts in a well-run, well-organized facility using "well-broken-in" line production technology than to continue the manufacture of "gold-plated" parts on a piecework basis in each customer-facility.

The manufacture of spare parts by personnel of machinery-manufacturing enterprises is part of the more general problem of firm-based repair in the machine-building industry. Of the advantages it offers we see no little written in the press these days, and the fact is that there are indeed some achievements to be noted in this direction.

An example is the unique VAZ [Volga Automobile Plant] motor vehicle repair system, which is closely linked to its production operations. Granted, all bugs in the system may have yet to be worked out. Nevertheless, many of the principles upon which this system is based are worthy of our attention. The development of a network of repair enterprises, the specialization of these enterprises, their combination of both unit- and part-oriented repair methods, the reconditioning and rebuilding of certain worn-out parts and much else, the most important thing, though, being the high degree to which this specific type of production operation has been industrialized--all this still awaits analysis with a view to introduction on a more extensive basis.

Other branches have accumulated a certain amount of experience as well. The Ministry of the Machine-Tool and Tool-Manufacturing Industry system as well as the Ministry of

the Electrical Equipment Industry have specialized repair works as components of the Soyuzstankoremont and Soyuzelektroremont all-Union industrial associations. They perform major repairs on the models of equipment manufactured by these branches most widely in use. But there are very few of these repair facilities. According to the general scheme developed by the Experimental Scientific Research Institute of Metal-Cutting Machines (ENIMS), Soyuzstankoremont should have 50 of them. So far, however, there are only 11. At present rates of growth in capacity it will take decades to reach a level satisfying the needs of the national economy.

The Ministry of Chemical and Petroleum Machine Building has no enterprises like this at all.

But there is still another side to this question. Over the period of time in which a plant is manufacturing one model or another of a given type of equipment, a substantial number of improvements are being introduced step by step into the design of this equipment. The plant manufacturing this equipment must then regularly supply customers with the technical documentation making it possible for these modifications to be made in the course of the repair process as well as with the necessary parts and assemblies.

Why is it that we find ourselves in this situation, a situation in which these complex and costly things pass into the hands of the operators, to whose lot it then falls to worry about them, to prolong their "active life" to the extent permitted by their capacities and capabilities? This while machinery manufacturers, who hold the keys to a long and stable operating life, worry only about how to get it off their hands.... Why is it that attempts to build such essential bridges between the manufacturers and buyers of equipment undertaken with what is really the most important consideration in mind, that is, the efficient operation of this equipment, why is it that these attempts have met with no success?

For the indifference on the part of machine builders there is a simple explanation: lack of interest. Department plans direct their attention to the accomplishment of entirely different tasks. What is therefore necessary is for the machine-building ministry plan to incorporate appropriate volumes of major repairs on fixed capital, this in addition to the development of capacities for centralized equipment repair.

Only USSR Gosplan will be able to assume responsibility for such a major portion of our planning operations. At the same time we should provide economic stimuli which would give machine builders themselves incentive to seek out and then perform repairs.

Finally, there is one more circumstance. New machine tools and other equipment with complex hydraulic and electronic systems are very severe testers of our repair personnel; they test both the depth and the range of their knowledge. This is true of repair service workers as well as technical and engineering personnel. Our training programs are not measuring up to these requirements--neither those in our vocational and technical schools turning out mechanical repairmen nor those used to train future specialists in machine-building tekhnikums. Higher machine-building technical schools produce no such specialists whatsoever. They not only do not have the faculty required, they lack even the department itself.

So, let's sum up what we have been talking about. An inadequate system for organizing repair services is costing the country dearly. This is one of the clear-cut examples of the uneconomical economy, when in a race to achieve immediate departmental objectives (to turn out more new machine tools or equipment, to make a show in the reports

with its "good" statistics) ministries and departments lose sight of the national interest. To increase our output of new equipment by cutting back on the manufacture of spare parts does not only economic harm to the country, but social harm as well. We have turned out hundreds of new machines, but thousands are already standing idle for want of replacements for only minor components. This means that people are now doing the work by hand. So, labor productivity drops, quality falls off and this has a negative impact on attitudes.

Increasing our production of spare parts (and this applies, of course, not to the machine-tool industry alone) would be essentially equivalent to making available to the country the additional machinery and equipment now standing idle for long periods of time. Would it thus not be to advantage to cut back some on above-plan production and instead to manufacture more spare parts? To do all the necessary calculations to determine the proportions involved would, to all appearances, not be too difficult. But this would be precisely the sound economical approach to the problem, or in other words, the economical economy. The gainer would be the entire national economy, and that means all of us

#### Interbranch Center for Robot Technology Discussed

Riga SOVETSKAYA LATVIYA in Russian 23 Jul 81 p 2

[Article by E. Abolin'sh, first deputy chairman, Latvian SSR Gosplan: "'How to Overcome Barriers?,' Readers Respond to SOVETSKAYA LATVIYA"]

[Text] The Latvian SSR Gosplan has studied the proposals contained in Yu. Mikhaylov's article "How to Overcome Barriers?," which SOVETSKAYA LATVIYA published 8 May this year, and reports as follows.

Work under way at the Latvian SSR's Institute of Physics on the development of various units incorporating EMAGO devices is truly promising, what with the fact that it is offering important possibilities for automating a number of production processes, among them some involving piece working and component assembly. Further work on the application of the EMAGO will proceed simultaneously with the development, fabrication and introduction in a number of branches of the republic's economy of automatic manipulators (industrial robots) incorporating the EMAGO as an auxiliary device, in loading and positioning operations for example.

Organizational work is currently under way to set up a republic interbranch robotics technological design center with its own test facility. The center will also fabricate and introduce test models of automatic manipulators for enterprises and organizations located within the Latvian SSR. Questions involving organization for series production will then be resolved on the basis of final, operationally tested and more efficient designs.

In addition, the Latvian SSR Gosplan and the presidium of the republic Academy of Sciences are working together to improve the planning of our scientific efforts and reduce the periods of time required to introduce the end results of our scientific-technical research and development work, which are of vital importance in increasing rates of growth in labor productivity and in improving product quality. To this end, the Latvian SSR five-year plan for economic and social development confirms basic objectives with respect to the accomplishment of scientific-technical programs.

The republic Gosplan and the presidium of the Latvian SSR Academy of Sciences have also jointly organized a special group of scientists and specialists to study experience accumulated in employing regional systems to direct scientific and scientific-technical efforts and special public interdepartmental scientific-industrial associations in L'vov.

The author rightly considers work on the construction of facilities for the Latvian SSR Academy of Sciences over the course of the Tenth Five-Year Plan to have been unsatisfactory. The plan for volume of construction and installation work was fulfilled to the extent of only 64 per cent, 58 per cent for that by organizations of the Latvian SSR Ministry of Construction. Steps are being taken to improve this situation.

#### Machine-Building Developments Discussed

Moscow NEDELYA in Russian No 39, Sep 81 p 3

[Article: "Machines Striding Toward Tomorrow, 27 September - Machine Builders' Day"]

[Text] What new units and machine systems are to be manufactured over the course of the current five-year plan?

High-speed methods are now being employed in constructing the Krasnoyarski heavy excavator plant. To help us visualize the dimensions of this new enterprise, let us make the following comparison. Uralmash is now building one walking dragline with a bucket capacity of 40 cubic meters and a jib length of 80 meters every two years. This machine is as high as an 18-story building; its bucket could hold a KamAZ truck. Now the Krasnoyarsk plant is designed to turn out eight of these giant machines each year in addition to 60 excavators with a bucket capacity of 12.5 cubic meters.

A two-stand mill for cold-rolling tin for the canning industry is to be fabricated this year for the Karaganda metallurgical combine. Magnitka's metallurgists are going to get new equipment for their carbon strip cold-rolling shop. The Elektrostal'skiy Heavy Machine-Building Plant association is building a unit to weld unique multi-layer large-diameter pipe for gas pipelines with greater throughput. Technical documentation is being developed for the equipment for a giant furnace having a working volume of 5.580 cubic meters for the Cherepovets metallurgical plant.

Branch enterprises will be supplying metallurgists with a unique thick-sheet mill for making aluminum plate and sheet as well as a mill for hot-rolling 4.600-millimeter-wide steel plate.

The Uralmash association alone will make 2,025 high-duty drilling units over the course of the current five-year plan. Of these 445 are earmarked for West Siberia.

The Zhdanovtyazhmash association will increase its production of railroad tank and gondola cars. Special attention will be given to the manufacture of special-purpose rolling stock: gondola cars for carrying coal and ore, closed hopper cars for grain, cement and mineral fertilizers and flatcars for large containers. The Stakhanovskiy plant will be manufacturing new self-unloading cars which will increase the productivity of the labor involved in loading and unloading operations some three to four times.

The Eleventh Five-Year Plan has launched our heavy and transport machine-building industry upon a course toward the manufacture of machinery and equipment which will contribute to the economic utilization of material resources, particularly metal, fuel and electricity, as well as to greater per-unit capacities.

#### Renovation and Retooling of Uralmash Discussed

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Sep 82 p 1

[Article by V. Zotov, special SOTSIALISTICHESKAYA INDUSTRIYA correspondent: "A Plant and a Construction Project"]

[Text] Yes, the famous Uralmash, the pride of our domestic heavy machine-building industry, which less than two years from now will mark its fiftieth anniversary, is indeed experiencing a second childhood. Its characteristics include not only the fact that more and more modern new shops are to be seen taking shape on the plant site and that now under the sonorous Uralmash name goes not a single plant, but rather an enormous association of five enterprises. In continuing to provide such key branches of the national economy as metallurgy, machine building and the petroleum-extraction and coal industries with the heaviest-duty equipment, Uralmash is continually accelerating the rhythm of its own operations. Over the course of the Tenth Five-Year Plan alone it turned out some 100 models of new equipment accounting for a saving of more than 300 million rubles.

"The sources of Uralmash's high level of technical maturity, and at the same time of its youthfulness--these are determined by a great many factors." Sharing his ideas with us here is Vladimir Kondrat'yevich Vazhagov, the association's former chief engineer and now secretary of the party committee. "But we would have to consider plant expansion and the retooling and modernization of existing facilities among the most important."

Attention is given primarily to the priority projects on the agenda as it should be. So forging shop No. 38 is one of the facilities being renovated. They're putting a new roof on it. At first glance it looks like it would be a fairly simple matter. In fact, though, brigade leader Vyacheslav Rybakov and his men really have to be pretty skillful to be able to remove the panel together with the metal structure it rests on. For production life in the huge forging shop down below doesn't stop for a minute. The lion's share of the worktime involved here is going into removing the old roof. To help speed up this operation the shop assigned 10 workers to assist construction personnel. The new roof is no automated line. It would appear to have no direct impact upon production operations. But replacing the old lights floods the shop with light, it's now easier to breathe in it and, accordingly, easier to work in it as well.

Aleksandr Arkhipovich's brigade has a much more difficult task on its hands. Plant designers have developed a device to force molds from their flasks after casting (until now they have been simply knocked out) and then to dry-regenerate the mold mixture. Instead of filling the flask with the usual sand here, they use a self-hardening liquid mix. The advantages this offers over sand requires no demonstration. But this liquid forms a very hard block. So to loosen the mold the plant here has gone to the use of a special concrete breaker. The device frees foundry workers from a laborious operation, speeds up the mold turn-around process and restores the mixture for repeated use.

There are dozens of major sections and modest "plots" on which builders are working together with Uralmash personnel on the projects most important at this point--the 26th Party Congress determined that capital investment should be channeled first of all into renovation and reequipment. This includes the open-hearth mill and press, heat-treatment, assembly and other shops. The solid figure of 10 million rubles will provide a general measure of the total volume of renovation to be undertaken at Uralmash.

But nevertheless, despite the indisputable advantage this renovation offers, builders are reluctant to undertake it /even/ [in boldface] at Uralmash. We emphasize "even" because not every enterprise has its own permanent, large and well-established general contractor. The Uralmashstroy trust plays this role for Uralmash. What with the large volumes of new construction under way--the association is putting up two enormous plants and three large shops--you shouldn't expect to hear talk within the trust about any disadvantage to be associated with renovation. But discussion in both the directorate of the association and the party committee took as its starting point precisely the fact that the established factor by which adjustment is made for the difficulty of undertaking construction and installation work in existing facilities does not cover actual builder costs.

The cost of replacing the roof on the forging shop, for example, has been estimated to be 1 million rubles. But according to V. Vazhagov, the plant was forced to add on another 600,000 rubles for work that would not in fact be done to keep the builders from "going bankrupt."

"They're gonna go broke anyway," V. Prudnikov, chief of SU-32, remarked as he joined in the conversation. "As everybody knows, wages are computed on the basis of output. But how in the world are we supposed to provide any incentives for brigades working on renovation if their output for the first half of the year has been 3,002 rubles per worker, while those putting up new shops show 4,980 rubles?"

Vladimir Vladimirovich pointed out a great many other disparities, which, alas, do not elevate renovation into the ranks of the most prestigious kinds of work.

If to all this we add such other unfavorable conditions for builders as the fact that they have to work in hot shops without the benefits enjoyed by the regular workers employed full time there or that they must interrupt their work for the constant flow of in-plant production vehicles, then we find ourselves willy-nilly sharing the view of those who insist that, as far as the field of construction is concerned, our lawmakers have yet fully to acquaint themselves with the entire range of questions associated with renovation operations.

It may appear illogical to speak on the one hand of the second childhood of a major heavy machine-building plant and then on the other to broach these familiar, we might even say wearisome, worrisome, questions. The criticism would be justified. But as the saying goes, you can't leave any words out of the song.

## Electron-Beam Welding Discussed

Moscow EKONOMICHESKAYA GAZETA in Russian No 40, Oct 81 p 15

[Article by V. Denisov, engineer: "An Electron Beam Does the Welding, On the Frontiers of Science and Technology"]

[Text] Electron-beam welding is coming to play an increasingly important role in the production processes involved in machine building. It is based upon the following phenomenon: great amounts of heat are generated when an object is bombarded by a highly focused beam of electrons accelerated to energies of 30-200 kiloelectronvolts. These beams are formed by special electron guns having capacities as great as 120 kilowatts. The power concentrated in these beams is greater than in other known sources of heat. The result then is an intensive melting and vaporization of the metals involved.

### Experimentally Proven

Experiments have demonstrated that electron beams can penetrate to depths of 300 millimeters creating a melt zone 8-10 millimeters wide. These are the dimensions of welding seams formed by the movement of a beam along the joint between abutting ends of pieces to be welded together. Deep, narrow seams make it possible to create continuous bonds between very thick metals in a single pass. Conventional arc-welding methods require hundreds of passes. Electron-beam welding accordingly offers a substantial increase in the productivity of labor involved in welding operations.

Electron-beam welding offers other advantages as well. It reduces welding deformation and stresses in the metal at least five-fold. It requires no filler metals or fluxes, and it is no longer necessary to prepare the edges of the materials to be joined.

Highly concentrated electron beams are formed in a vacuum. At the same time this protects the metals to be welded from effects of the atmosphere. It has thus been possible to create seams closely approximating the properties of the parent metal, whether it be a high-strength steel or a copper, aluminum, titanium, niobium or zirconium alloy.

We have now made thorough scientific studies of electron beams of different powers and configurations, the processes by which they interact with metals and of the formation of high-quality seams and established optimum conditions for the application of progressive welding method. The Ukrainian Academy of Sciences' Institute imeni Ye. O. Paton has achieved especially important results.

Electron beams and power sources, vacuum chambers and air evacuation systems and devices to control and automate basic assembly, welding and inspection operations have now been developed and put into series production. Electron-beam welding is now employed in the fabrication of critically important components in a number of branches of the machine-building industry (electric-power, chemical and heavy machine building) as well as in the motor-vehicle and tractor industries. It makes it possible to produce reliable welds of chemically active and refractory metals and of high-alloy steels and a variety of metals.

As compared with other kinds of welding, the development of electron-beam welding requires relatively large capital outlays, and skilled personnel are needed to operate

and maintain the equipment involved. But because of the better product quality, lower labor intensity, higher labor productivity and reduced expenditures for materials the economic advantage gained is much greater than these outlays.

This progressive technology is already employed in the fabrication of a substantial number of components and assemblies in the power machine-building industry. Two devices are now in operation in the Izhorskiy zavod association. Two more units just like them used to weld packs of steam-turbine impeller blades have gone into service in the Lenin-gradskiy metallicheskiy zavod association. The Podol'sk machine-building plant has put three units into operation for welding heat exchangers. The Nevskiy zavod and Turbotornyy zavod associations (Sverdlovsk) are now employing electron-beam welding to join gas turbine components.

This advanced technology has also been introduced in a number of enterprises in the heavy and transport machine-building industries. The Zhdanovtyazhmash association uses electron-beam welding to make pipe from stainless and special-purpose steels, while the Uralmash association employs it in the manufacture of hydraulic cylinders. The Central Scientific Institute for Research in Machine-Building Technology has set up a special laboratory.

A number of units have been put into operation in motor vehicle plants, to include those employed to weld gear box pinions at KamAZ and the L'vov bus works. Electron-beam welding is being introduced in enterprises of Minelektronprom [Ministry of the Electronics Industry], Minstankoprom [Ministry of the Machine-Tool and Tool-Building Industry], Minkhimmash [Ministry of Petroleum and Chemical Machine Building] and a number of other ministries.

The USSR State Committee on Science and Technology coordinates the work of branch ministries and departments. During the past five-year-plan period, as part of the SCST [USSR State Committee on Science and Technology] program, the Institute imeni Ye. O. Paton working jointly with Minenergomash's [Ministry of Power Machine Building] Central Scientific Institute for Research in Machine-Building Technology and the Moscow Institute of Power Engineering developed the technology for electron-beam welding of thick-walled (up to 250 millimeters) structures, which now makes it possible to reduce the labor intensity of the manufacturing process some 3-4-fold and at the same time increase the quality of the product. The Izhorskiy zavod association has fabricated critically important atomic reactor components. This made it possible last year to achieve savings of some one-half million rubles.

Experience now gained in the application of electron-beam welding shows it to be economically advantageous in combination with special-purpose, high-duty equipment and rational design of the weld joint. In putting the SCST program into effect, the Institute imeni Ye. O. Paton jointly with enterprises of Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] and Minelektrotekhprom [Ministry of the Electrical Equipment Industry] have accordingly developed a set of power equipment for electron-beam welding of metals up to 250 millimeters thick. The set is being fabricated by the institute's pilot welding facility.

We have now thoroughly tested five types of electron guns with power sources, six vacuum chambers with evacuation systems and welding manipulators, devices to aim the beams at the seams and beam control devices.



While electron-beam welding was formerly employed to produce primarily straight or circumferential seams, it is now being used more extensively to join pieces with seams in complex patterns. We are at the same time developing automatic equipment which will not only weld pieces in series and mass production, but also assemble them, press them, move them to a work area and then unload them.

Recent years have seen the introduction of systems for welding large pieces made of very thick aluminum and magnesium alloys. Now in successful operation are dozens of unique large vacuum chambers with capacities of up to more than 100 cubic meters.

What next?

The scales on which electron-beam welding is being introduced nevertheless remain inadequate. The situation here is as follows.

According to estimates by the Institute imeni Ye. O. Paton, some 60 per cent of all units now in operation are in laboratories, where 38 per cent are used for scientific research and engineering R&D. These laboratory devices are used on the average to half capacity, those employed under actual production conditions even less--to the extent of only 44 per cent. Since the high productivity of the electron-beam welding process makes it possible for some plants to accomplish their annual program within only a few months, they usually stand idle the rest of the time. Branch-level cooperation in welding operations is weak, all the more is this the case with interbranch cooperation.

Enterprises not infrequently point to the fact that there is no large-scale, centralized manufacture of large units for electron-beam welding. But this cannot be seen as any justification for taking so long to introduce new technology. Orders for the smaller pieces of power and vacuum equipment (guns, power sources, vacuum pumps) are, in the overwhelming majority of instances, filled. But as far as large-scale vacuum chambers and assembly and welding equipment are concerned, it would be to greater advantage to fabricate them at the customer plants themselves. It can be said with confidence that all necessary conditions prevail within our machine-building industry for further development and expansion of the sphere within which we can employ this highly productive electron-beam welding technology, most importantly to fabricate large pieces from very thick billets.

SCST has developed and approved its program for the period 1981-1985.

With assistance from the Institute imeni Ye. O. Paton, machine-tool manufacturers are being called upon in 1982 to complete their research, development and testing efforts in the field of electron-beam welding technology to be employed in the production of precision billets. As far as Mintyazhmash [Ministry of Heavy and Transport Machine Building] enterprises are concerned, it has been established that more of the new technology can be applied in the following associations: Penzdizel'mash - in the production of turbocompressor shafts, Zvezda (Leningrad) - for manufacturing diesel engine pistons, Rudgormash (Voronezh) - to fabricate hydraulic cylinders and at the Berislav machine-building plant in the manufacture of heat exchangers. Working together with scientists, power machine builders are now engaged in research on the development of an advanced technology for welding components for gas-pumping units. Over the course of the Eleventh-Five-Year-Plan period, Minkhimmash and the UkSSR Academy of Sciences will be involved in an effort to develop the equipment and then

introduce the technology for electron-beam welding fittings for atomic power plants in the Penztyazhpromarmatura and Kaztyazhpromarmatura associations.

Electron-beam welding has already become a "partner" with equal rights among other methods now employed in the manufacture of units and assemblies for machinery and equipment. It is now important to remove barriers in the way of efforts to introduce it on a more extensive basis and to exploit more fully the advantages it offers in the way of increasing production efficiency and improving product quality.

#### Steel-Rolling Mill at Zhdanov Metallurgical Plant behind Schedule

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Oct 81 p 1

[Article by G. Dorofeyev, special SOTSIALISTICHESKAYA INDUSTRIYA correspondent: "Disrupting Plans, Introduce and Assimilate New Capacities More Quickly"]

[Text] The Zhdanov Metallurgical Plant imeni Il'ich's "3000" rolling mill, incorporated in decisions of the 26th CPSU Congress, is one of the five-year plan's most important projects. So it is only natural that the unwavering attention of both party and economic administrative organs has been riveted upon it. The Donetskaya Oblast committee and the Zhdanov city party committee are monitoring work on the "3000" continuously. The republic Minchermet [Ministry of Ferrous Metallurgy] and Mintyazhstroy [Ministry of Heavy-Industry Enterprise Construction] are heavily involved in this project. Some 5000 workers are already at work on the mill, with one and one-half to two times that many expected to be on the job here by the end of the year. They should be consuming roughly 10 million rubles in capital investment each month, that is, double the figure for the middle of the year.

All this is necessary to make up for having fallen behind, a lag which at present rates of construction will take six months to overcome. M. Finkel'shteyn, the Zhdanovstroy combine's chief engineer (he's in charge of the construction of the entire complex), gives the traditional explanation for the lag: shortage of manpower and disruptions in deliveries of metal structures and reinforced concrete. As far as the deliveries are concerned, of course, he's right. But on the list of those responsible for disrupting plans is none other than the customer himself, the Il'ich plant, which has not insured timely delivery of needed bridge cranes or fully released the land included in the construction site.

On the other hand, however, the performance turned in so far by organizations of the Zhdanovstroy combine has been very far from perfect. It would accordingly be impossible to agree unconditionally that work on the project is suffering from a big manpower shortage. The workforce now on the job is far from being used to its fullest capacity.

Let's have a look at the situation within the brigades, that is, within the units which in the final analysis decide the fate of all plans. The brigade led by G. Kolo-dochka (SU-3, Azovstal'stroy trust), for example, was assigned targets for September which were roughly one-third below its previous targets. The same is true of the trust's other brigades. But they are not reaching even these "reduced" targets.

Neither does the state of affairs in the Zhdanovmetallurgstroy trust's Prokatstroy administration do much to inspire enthusiasm. The brigades here are able to handle their reduced plan assignments, but on the other hand, the administration as a whole

is not reaching its targets for growth in labor productivity. Now there's a mystery for you! Brigade leader D. Bakhov had an easy explanation for it:

"The concrete we get delivered is absolutely worthless. If we pour a foundation with it we have to do the whole thing over again. The metal is delivered loose, and then we have to tie the reinforcement here at the site ourselves. It seems like we're just working up a sweat for nothing."

D. Bakhov mentioned another detail we should look at. The brigades, these little micro-organizations, have now managed to put up their own nice bureaucratic barrier. Here's the situation: the crane operator in Bakhov's own brigade is subordinate to the mechanization administration, that is, to an allied organization. Now its interests frequently do not jibe with the builders' requirements. There are occasions when the latter are stewing to get something done, but the crane operator turns out to be in no hurry; his main task is simply to spend the required number of hours in his cab.

So now the question arises--if project supervisors have not been able to incorporate the crane operator into the brigade, that is, to do a most elementary thing, how in the world are they solving more complicated problems?

As we have already pointed out, an enormous volume of manpower and resources is now being concentrated on the construction of the "3000" mill. (The volume of capital investment this year has been increased by approximately one-third, the figure now standing at 62 million rubles.) We have to get the project out of the jam it's in. But at what price? Streetcar operation has now come to a virtual standstill, as has work on the polyclinic, facilities vitally necessary to this phase of the project. All efforts have been concentrated on the production sector. Project and republic Mintyazhstroy officials are hoping to make up lost time--and as usual, by sacrificing their "rear services." Okay, so it's entirely probable that the mill will be turned over for operation on schedule. But who will there then be to work in it? The Il'ich plant is already short on manpower. And one of the reasons for this shortage is insufficient housing and other human services. It would be naive to think it's going to be possible to man the new facility without them.

Somehow it's hard to believe that anything satisfactory is going to come of a plan where first you build the production facilities and then you throw all your manpower and resources into creating the social, cultural and human services support in an effort to "produce" all this at a single stroke. Once you've let something slip like this there's no catching up.

It's not enough to assemble thousands of people in one place and round up equipment from virtually all over the republic. You also have put care and thought into organizing the interaction involved here. This, unfortunately, is not being done. What good does it do for organizations of one ministry--the republic Mintyazhstroy in this instance--to be continually leaving one another in the lurch? Branch headquarters should now have long since put pressure on senior officials of the Ukrstal'konstruktsiya and Ukrtyazhstroyindustriya associations, which have chronically failed to make scheduled deliveries to the Zhdanovstroy combine. And what's going to happen when units from large organizations like Krivbasstroy, Severodonetskhhimstroy and Donetsktyazhstroy are transferred to the "3000" project? One thing we can say: the picture is not going to clear up any if the planning and organization of material and technical support remain at their past level.

## Laser Lathe Discussed

Moscow MOSKOVSKAYA PRAVDA in Russian 13 Oct 81 p 1

[Article: "Accurate to Within Microns, Science for Industry"]

[Text] A laser lathe controlled by an automatic system now makes it possible to work pieces with an accuracy to within 10 microns. It has been developed by specialists of the Order of the Red Banner of Labor Experimental Scientific Research Institute of Metal-Cutting Machines. The lathe control system is the result of the labors of a creative group at the Tsentrspetsavtomatika association's special technological design bureau. The introduction of this device has made it possible to work apertures and cut hard-to-work materials.

Automation of this production process has made it possible to eliminate heavy manual labor entirely. This has improved working conditions and increased productivity tens of times.

## Problems in Machine Development Discussed

Moscow EKONOMICHESKAYA GAZETA in Russian No 49, Dec 81 p 15

[Article V. Varavka: "The Mark of the Innovator, From a Correspondent's Notebook"]

[Text] When the conversation touched upon his secret dream, Vladimir Pavlovich began to speak more enthusiastically, excitedly, passionately:

"Look at how a complex machine part takes shape in most of our plants, with their well-established "classical" technology. A billet will sometimes pass through a couple of dozen mills, each of which more frequently than not performs a single operation. Occasionally one will "crawl" around a shop for a couple of weeks, with the efforts of dozens of people and an entire inventory of costly equipment absorbed in working it. All this spurred the group to concentrate its efforts upon the development of a new technology, new equipment, a system in which a single unit operating in an automatic mode could perform a multitude of operations."

I kept this note with me after my first meeting with Vladimir Pavlovich Kabaidze, now general director of the Ivanovskoye machine-tool manufacturing combine. The primary enterprise, which he was then managing, manufactured primarily heavy horizontal boring and radial drilling machines. Nobody ever complained about their quality, no claims ever came in, and there had been no decline in orders. In a word, the place was able to do its job comfortably, receive its wage bonuses and, as they say, wait for orders from the top. But Vladimir Pavlovich and his colleagues from the different departments and shops had not allowed themselves to settle into any carefree routine.

He would frequently say: "We machine-tool makers have an impact upon essentially the entire metalworking industry. Our objective is to insure continuous increases in production efficiency both in our own operations and in those of our customers."

## Gaining Time

Even as they continued to turn out their "traditional" machine tools, these innovators would frequently meet together and exchange views. They looked over dozens of possible

models of the latest domestic and foreign machines until, finally, they came around to seeing the need to create processing centers.

It should be pointed out here that OTs [processing centers (PC)] were already to be found at that time (five years ago) both here and abroad. But the Ivanovtsy did not take the easiest course of "artful imitation."

What is the typical route by which a series-produced technical innovation comes to see the light of day, a route now established over the decades? First a scientific research institute or technological design institute "draws" the basic outline of the new creation. A special design bureau will then develop the technical documentation; after that you build a test model of the thing (usually in an experimental shop) and then--then comes the initial run and only at that point is the piece finally put into mass production. The whole process takes a minimum of four years.

Under the specific conditions prevailing in their situation, the Ivanovo machine-tool makers were able to shorten the cycle required to produce a model of a machine by putting all the necessary stages of the work in the same hands. They organized the whole process involved in creating their PC on the basis of a very highly condensed, combined schedule. Drawings for pieces move as if by conveyor from the designers to production engineers, modellers, metallurgists, machine operators and assemblers. The first processing center was set up and tested within all of 12 months.

However, the sharp reduction in the time required to set up a PC and the good technical-economic data on these centers, about which more below, are to a substantial degree the result of the painstaking preparation of the production facility. The association organized a special design bureau of more than 300 designers. At work here is a group of truly talented electronics engineers, production engineers and specialists in other fields.

EKONOMICHESKAYA GAZETA has already written that, in the interest of mobilizing a maximum of creative energy, these engineering and technical personnel, as an exception and with the permission of the ministry, were periodically switched over to a job-contract-plus-bonus pay system. It has justified itself and gained precious quarters and years for the development of new equipment. And then in the final analysis, the general wage fund was not overextended; on the contrary, it even realized a saving. So why is it, then, that this experience in stimulating, providing incentives for achievement, so far not legalized by any instructions or decrees, but which is yielding very substantial advantages, has yet to arouse any interest on the part of the comrades of Goskomtrud SSSR [USSR State Committee on Labor and Social Problems] and the USSR State Committee on Science and Technology? Those controls, which help bring about technical progress and advance our economy, must be operated.

#### A Guarantee of Quality

I'm now looking over the next page in the notebook, where I see underlined the words "rates" and "quality." They bring back to mind that curious controversy within association's headquarters concerning the connection between a combined method of processing center organization and the probability that defective pieces would slip through. Some argued that this setup would weaken control over all products of center operation. Others--the director, chief engineer Konstantin Yakovlevich Firsov, chief designer Stanislav Yevgen'yevich Gurychev and personnel of the technical control department--no less passionately pressed precisely the opposite point of view. In their opinion,

any operator, knowing full well that there was no one else to catch and correct any results of his negligence, would do his job with an especially deep sense of responsibility.

When a person is caught up and absorbed by something, he will try, giving no thought to the time involved, to do the most he can the best he can today, in a given hour, this very minute. It has long since been observed as well that capable specialists more quickly make their mark and develop precisely in the process of accomplishing difficult tasks.

The creative search undertaken by these machine-tool builders found enthusiastic support from the party oblast committee and the branch ministry. Over the course of the second half of the Tenth Five-Year Plan period the association management, its design office and the party organization launched an effort to step up their output of PC in various modifications.

The Ivanovo machine-tool builders are now transforming their plant in accordance with the new thinking. You can see these modern units in the shops everywhere now. If formerly they appeared as mere dots, miniscule islands amid a mass of drilling and other special machines, these unique automatic units are today in the process of quickly squeezing out their predecessors.

The directors and party committee have repeatedly and persistently raised the question of having the enterprise specialize in the fabrication of these processing centers exclusively. Minstankoprom [Ministry of the Machine-Tool and Tool-Manufacturing Industry] and the central planning agencies listened to the Ivanovtsy's ideas and then responded positively to their request. Beginning in 1982, these PC will constitute the association's leading, primary product.

#### PC Potential

In one of the sections of the main enterprise you can see written in letters over two feet high: "Our slogan: New Equipment at Accelerated Rates of Production, From this New Equipment--Maximum Efficiency." We have now already talked about the first part of this management formula. It remains only to add that the work of this 5000-man collective has won high praise from Leonid Il'ich Brezhnev precisely for its very quick organization of the series production of these multioperation units with their programmed control. And now, when Ivanovo processing centers have "found their way" into many plants in the USSR and other countries and have accumulated considerable work experience, we have every reason to speak of the realization of the second half of the formula as well.

It has been calculated that the OTs-IR-800 is eight to ten times more productive than the drilling machines the enterprise used to make and saves the national economy more than 60,000 rubles annually. The processing center mills, drills, bores and threads, while the latest model, referred to affectionately as "Malysh" [Peewee], will also grind and polish. That is, as far as its tasks are concerned, this unit performs virtually any, even the most complicated operations and can turn out a piece of frequently suprisingly complex configuration.

After receiving its programmed job, the PC then, without requiring readjustment, turns to its work, which occasionally runs an entire shift. It requires only a single operator. This being the case, this single operator can without unnecessarily fatiguing

himself run not one, but two or three of these automatic units at the same time. This sharply increases labor productivity and, what is no less important, makes for much more efficient and economical metal consumption. Whether it's a dozen and a half machines or one, even if it's a little bigger, there is still a difference, and a substantial one at that not even counting the floor space freed up within a production facility.

Another enormous advantage offered by these PC lies in the fact that they can be installed very quickly and for all practical purposes put into immediate operation. Two or three months if not more would be required to set up an automatic line, while given good organization it takes only a few days to install a PC.

And then there is one other extraordinarily important feature. The association is not simply turning out processing centers, but offering along with them an entire technology, taking the customer under its wing, as it were. The customer describes the job that has to be done, while how to do the job remains the concern of the machine-tool makers, who supply their customers with sets of tools and then make the electronics for them. And the guarantee here has no time limit, six months or a year for example, but a reliable permanent guarantee.

Ivanovo machine-tool makers are now polishing up an even more alluring though at the same time more challenging idea for making further technical progress. It has been decided to build an entire section from computer-controlled modules. It will replace a large shop with general-purpose machines and a substantial number of workers. This system will see billets mechanically fed for working directly from their storage facility with only a few engineers and operators running the operation by means of an almost invisible process. Technology without the human being remains a dream, whose realization, as well as increased production of processing centers generally, will require more active, effective everyday assistance from Minstankoprom.

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## METALWORKING EQUIPMENT

### SOME MACHINEBUILDING UNITS NOT USING IMPROVED PLANNING, INCENTIVE INDICATORS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 4, Apr 82 (signed to press 24 Mar 82) pp 123-124

[Article: "In USSR Gosplan"]

[Text] The matter of improving planning indicators and the evaluation of machinebuilding enterprise activity was examined at a meeting of the Interagency Commission under USSR Gosplan. It was noted that paragraph 9 of the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979 is being carried out unsatisfactorily by some USSR Gosplan sections and machinebuilding ministries in regard to introducing the required changes into the system of in-kind measurers of output that is based upon the wide use of scientifically substantiated technical and economic indicators and that will enable the effectiveness, quality, and other customer characteristics of the output to be considered.

Selective changes have been introduced into the in-kind indicators for machinebuilding branches. Experience in the application of the new, progressive indicators exists at associations and enterprises. At the same time, some types of output are measured in tons, a method that does not help activities to be guided by economics. Not all ministries are converting to planning the production of equipment in accordance with an expanded products mix in units of measurement that will reflect more completely the equipment's productivity and other economic characteristics.

Many machinebuilding enterprises continue to produce output that does not meet modern requirements. The machinebuilding ministries are not taking the required measures, jointly with USSR Gosstandart [State Committee for Standards], for examining obsolete standards for machines and equipment with a view to including in the new standards, along with other qualitative characteristics, requirements that will provide for a reduction in the weight of the articles, a cut in fuel and energy consumption during their operation, and unification of parts, components and instruments.

The measures for restructuring the work of scientific-research, design, and design-development and technological organizations that were called for by the decree are being implemented slowly. The role of orders and job authorizations (or contracts) and the final results of scientific and technical developments in the economic computations system is not being raised adequately. Workers of the indicated organizations are being awarded bonuses without due consideration being given



to the total economic benefit actually obtained by the national economy from using scientific and technological achievements. Thus' in Mintyazhmash [Ministry of Heavy Machine Building], Minavtoprom [Ministry of Automotive Industry], Minenergoprom [Ministry of Power Machine Building] and Minsel'khoz mash [Ministry of Tractor and Agricultural Machine Building] the creation of a substantial portion of the incentive funds does not depend upon the economic benefit to the national economy. Scientific-research, design-development and technological organizations are being converted extremely slowly to the system of computations for work that has been completed and adopted fully by the client.

The Interagency Commission under USSR Gosplan decrees:

The Consolidated Section for Machinebuilding and Interindustry Production, other machinebuilding sections, the Section for Improvement of Planning and Economic Incentives of USSR Gosplan and NIIPiN [Scientific-Research Institute for Planning and Standards] under USSR Gosplan, with the participation of the machinebuilding ministries, are to speed up the work to improve plan indicators for output, expressing them in in-kind terms, and report the results to the Interagency Commission under USSR Gosplan;

The machinebuilding ministries are to intensify the work to implement the CPSU Central Committee and USSR Council of Ministers decree of 12 July 1979 with reference to the improvement of plan indicators, the introduction of new standards, and the improvement of planning and economic incentives in the branch's scientific-research, design-development and technological organizations, and also the work to take other steps that will provide for increased effectiveness of scientific and technical developments, expansion of the output of new and highly effective articles, and the removal of obsolete products from production;

The machinebuilding ministries are to provide as quickly as possible for conversion to paying for scientific-research, design-development and technological work that is completely finished and adopted by the client, based upon the principles issued by USSR Gosbank on this question;

The Consolidated Section for Machinebuilding and Interindustry Production, the Section for Improving Planning and Economic Incentives and NIIPiN under USSR Gosplan, jointly with Minelektrotekhprom [Ministry of Electrical Equipment Industry], are to review the matter of the possibility of using more widely Minelektrotekhprom's experience in setting the pace for growth in amounts of standard-equivalent net output and of labor productivity, taking into account the share of the economic benefit from production and the use of new types of articles of the highest quality category, and they are to introduce proposals, for examination by the Interagency Commission under USSR Gosplan, about the desirability of disseminating this experience to other industries; and

With a view to supporting coordination of the work to improve the system of indicators for planning and economic incentives for the production of machinebuilding output, a working group of the Interdepartmental Commission is to be formed under the Consolidated Section of Machinebuilding and Interindustry Production of USSR Gosplan.

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